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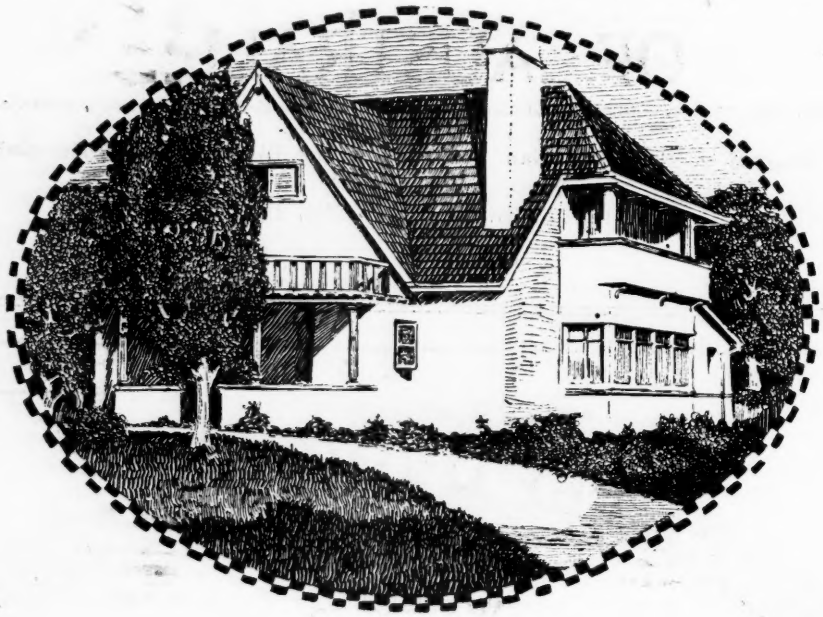

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VOL. I.—8TH YEAR. SYDNEY: SATURDAY, JUNE 11, 1921. No. 24.

SPINAL ANALGESIA IN URINARY SURGERY.[1]

By **Robert J. Silverton, M.B., Ch.M. (Syd.), F.R.C.S. (Edin.),**

Introduction.

I have chosen the title "Spinal Analgesia in Urinary Surgery" since my personal experience with spinal analgesia has been in this branch, but of course many of the following remarks are applicable to the use of spinal analgesia in general surgery.

For reasons to be given later on in this paper I may declare at the outset my conviction that as a general rule spinal analgesia is unsuitable for operations above the umbilicus. Except renal work practically all urological operations are sub-umbilical. If level were the only concern gynæcology would offer great scope for spinal analgesia, and indeed in some parts of the world gynæcologists as well as urologists are using spinal analgesia more and more. Under certain circumstances spinal analgesia may be used with safety for upper abdominal work but, as a rule, is better avoided at this level. If the patient is too bad for general anæsthesia local anæsthesia should be employed and is, in such debilitated people, preferable to spinal analgesia at this level, for too great a fall in blood pressure is dangerous. Below the umbilicus, however, spinal analgesia may be used for any type of operation, as the excessive fall of blood pressure and other ill effects of analgesia produced at a higher level are avoided.

A. M. Page(1) gives as the general indications for spinal analgesia (*a*) cases where it is particularly desired to abolish shock, and (*b*) where the surgeon's manipulations and consequently his speed are likely to be helped by securing a greater degree of muscular relaxation than is obtainable with general anæsthesia. As types of operation especially calling for spinal analgesia he gives the following list:

(1) Acute abdomens (especially if septic).
(2) Prolonged abdominal operations, likely to be followed by shock.
(3) Amputations of the lower extremities.
(4) Operations on bones of the lower limbs.
(5) Certain genito-urinary and gynæcological operations.

During the past few years it has been recognized that stovaine and other analgesics commonly employed undergo a considerable degree of fixation to the nerve structures with which they are in contact during the first few minutes after injection. On this account the Trendelenburg position is not dangerous as was thought until only a few years ago, but is even an advantage as it helps to overcome some of the effects of the fall in blood pressure.

This paper is based on a study of 106 urological cases operated upon under spinal analgesia at St. Peter's Hospital, London.

While in Cairo I was greatly impressed with the results of spinal analgesia which is used almost as a routine for operations below the ribs in the large Egyptian Hospital of that city. The results in gynæcological cases were especially good.

When later on I was working as senior house surgeon to St. Peter's Hospital in London, I asked the visiting anæsthetists why spinal analgesia was not employed, as so many urological cases seemed to call for it. The answer was that the method was certainly advisable for prostatic and some other urinary cases but that the percentage of troublesome headaches following its use was rather large. Through the kindness of the honorary surgeons under whom I worked I was allowed to give spinal injections in most of the 106 cases I am reporting. The results have been good and I believe that with due attention to dosage, posture and several other important factors one may considerably reduce the proportion of headaches following the procedure.

In the literature of the past five years no reports of the occurrence of serious after-effects, such as nerve paralysis, are to be found. Before this period there were isolated cases. Where death has occurred I believe that either an entirely unsuitable patient has been injected, or else too large a dose has been given or some other important mistake made. I do not include in this statement the high analgesias as practised by Jonnesco, which I consider unjustifiable.

Analgesic Agents.

Bier in 1898 was the first to inject analgesics into the spinal theca, using cocaine with which, however, unpleasant effects followed in himself as well as his patients. Fourneau discovered stovaine in 1904 and the drug was soon afterwards employed by Chaput and other French surgeons. Chaput's solution was much heavier than the cerebro-spinal fluid, containing 10% of sodium chloride as well as 10% of stovaine. The specific gravity of the spinal fluid is about 1.006, that of Chaput's solution 1.083. But this greater weight, though shown later by Barker to be an important advantage, was not Chaput's original reason for employing this solution. It was intended that the high percentage of NaCl would prevent to some degree the splitting up of the stovaine by the alkalinity of the spinal fluid. Its effect, however, in this direction has been proved to be very slight. In 1907 Barker, of University College Hospital, published the results of his experiments on the movements of fluids of varying densities in an artificial spinal canal(2). He also described his results with spinal analgesia in 100 cases of various operations. This article, masterly in character, laid the foundation for the safe and rational use of spinal analgesia and no better work has since been written. Barker showed by observing the movements of coloured solutions that a small amount of a solution of greater specific gravity moved fairly quickly to the most dependent part of a column of lighter fluid into which it was very gently introduced. The column of fluid he employed was a glass tube bent to the shape of the spinal canal. This apparatus was tilted to various angles to test the effect of gravity on the

[1] Read at a Meeting of the New South Wales Branch of the British Medical Association on April 29, 1921.

behaviour of fluids of varying densities. Barker attributed the good results of the French with Chaput's solution to its weight; movement up the spinal theca from a lumbar injection was thereby secured, with a resulting sufficient analgesia for abdominal operations. He disapproved, however, of Chaput's solution on account of its hypertonicity from the 10% NaCl content. Barker's own original solution contained 10% stovaine and 5% glucose. It was more nearly isotonic with the spinal fluid, and according to him less irritating to nerve structures on this account. Its specific gravity was 1.030, that is, heavier than the spinal fluid but lighter than Chaput's solution. Since then Barker's No. 2 solution containing stovaine 5% and glucose 5% has come into general use. It is a little lighter (S.G. 1.023) than his original fluid but moves very well under gravity influence in the spinal theca.

Various analgesics other than stovaine are employed, notably tropacocaine and novocain. Tropacocaine I have used and find it to be of equal analgesic value with stovaine, but it possesses no advantages in the way of lesser toxicity. It is heavier than stovaine, so only about 2% glucose need be used in making up the analgesic solution. The dose of tropacocaine is the same as that of stovaine. Novocain is also employed and claimed to be less toxic. Its dose is a little less than double that of stovaine. Of the cases I am reporting in this paper, stovaine was used in 90%; the remainder were given tropacocaine.

Movement of the Analgesic in the Theca.

Some surgeons employ a solution of equal or slightly less weight than the spinal fluid but as Barker conclusively demonstrated, its movement in the theca is not nearly so much under the surgeon's control as the heavy solution. Where the injection is made in the lumbar region only the sacral and the lower lumbar nerve roots are immediately anæsthetized. When a lower abdominal operation is to be performed one must secure the action of the stovaine on the lower six thoracic nerve roots as well as all the lumbar, for even in a sub-umbilical abdominal operation it is wise to secure analgesia for a moderate distance above the umbilicus. For this purpose a level of a little below the tip of the xiphoid cartilage is sufficient as a rule. When upper abdominal work or renal operations are to be performed the analgesic should, speaking generally, reach to a little above the nipples.

Thus for renal or upper abdominal work the patient must be postured before the injection so that the most dependent part of the vertebral canal is opposite the fifth thoracic nerve roots. When the heavy fluid reaches this level it stays there for the most part, but a little will diffuse upwards and anæsthetize the fourth thoracic nerve roots. This will secure analgesia to about 5 cm. above the nipples. To secure the correct posture then for upper abdominal analgesia the patient is so placed that the third thoracic spine is the lowest part of the vertebral canal, this point being opposite the fifth nerve roots. Details of the technique will be given later.

For sub-umbilical abdominal operations the analgesic should only be made to gravitate as far as the eighth thoracic nerve roots. By slight diffusion above this it will anæsthetize the seventh nerve roots as well, thus securing analgesia up to the tip of the xiphoid. The eighth nerve roots are opposite the sixth thoracic spine so the latter point should be made the most dependent part in posturing the patient.

For operations involving only the perineum, urethra, bladder, or other parts with a purely sacral nerve supply, a technique is employed involving the retention of the analgesic in the lowermost part of the theca during the fixation period of the stovaine.

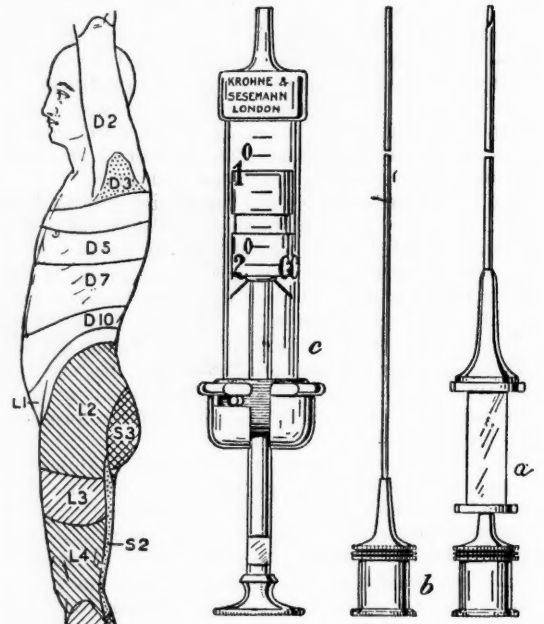


FIGURE II..

FIGURE II..
The Bier Type of Needle, with short bevel (*a*), Barker's syringe (*c*) and cannula (*b*), the latter projecting 1 mm. beyond the point of the needle (Barker).

FIGURE I..
Lateral View of Segmented Skin Sensory Areas (after Tooth).

FIGURE I..

I shall defer the description of the special technique for this region until describing the cases in which it was employed.

I should like to make passing mention of the technique suitable for securing analgesia of the lower limbs, for the value is obvious of using spinal analgesia in any operations in this region involving much shock or where the surgeon urgently desires complete muscular relaxation. The segmental nerve supply of the lower limbs is complicated (Fig. 1) and this accounts for the very diverse descriptions of the phenomena immediately following the lumbar injection of stovaine. Some writers, Jonnesco for instance(3), say that the first sign is a sensation of tingling com-

mencing at the roots of the limbs and spreading to their extremities. The analgesia commences to spread in the same manner, and finally over the abdomen to the umbilicus. Others (the majority) describe the tingling and the analgesia as spreading from the feet upwards. When one realizes that any lumbar injection is opposite a bundle of nerves comprising several of the lower lumbar roots as well as the whose sacral leash of nerves, it can easily be understood that the initial effects vary in different cases. As a rule, however, the sacral nerve areas are the first to be anæsthetized. Not only the skin areas but also the muscles, bones, etc., of the lower limb have their supply from lumbar as well as sacral segments, so that it is necessary for lower limb operations to secure analgesia as high as the tenth thoracic segment of the cord. To this end the patient should be so placed that the ninth thoracic spine is the most

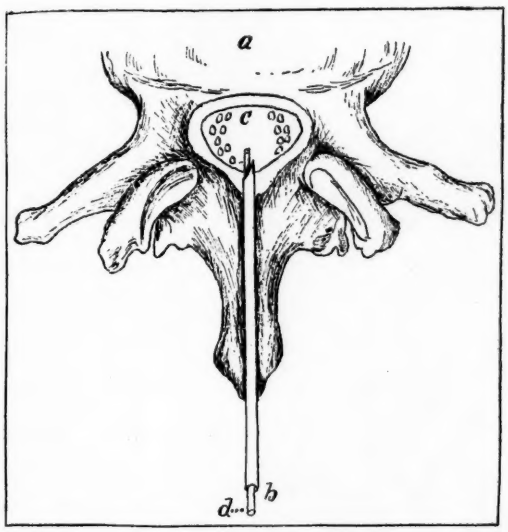


FIGURE III..
This sketch shows Bier's needle (*b*) only partly inside the theca (*c*). Insertion of Barker cannula (*d*) insures complete injection. The *cauda equina* is shown as two leashes, one to each side (Barker).

dependent part of the spinal canal. The analgesia will by this means cover the whole of the lower limbs and spread on the abdomen as far as the umbilicus.

Technique of Injection.

The most important requisite is a good syringe and needles. Barker's outfit is by far the best, and will insure with a maximum of certainty the injection of all the analgesic fluid into the theca (Fig. II.). The needle is inserted between two spinous processes in the middle line, armed with its well-fitting stylet to close the short bevel at the end. After it has been pushed in for about 5 cm. in the average individual, the stylet should be withdrawn and the needle pushed slowly onward until at a depth of about 7 cm. the theca is punctured and cerebro-spinal fluid drops out of the needle. One should take care that the fluid is dropping out freely, otherwise good analgesia is unlikely to follow. The needle may have to be rotated, pushed in a little farther or otherwise manipulated to secure a good flow.

Before inserting the needle into the patient's back the surgeon has already drawn up into Barker's syringe the required amount of analgesic solution by means of attaching Barker's fine cannula to the syringe and inserting the end of the cannula into the ampoule of stovaine. The cannula has two uses. Its calibre is so fine that practically no allowance need be made for the amount of analgesic required to fill its interior. Its more important use is, however, the assurance of complete injection of the stovaine into the theca (Fig. III.) Should the bevel at the end of Barker's needle be partly outside the theca some of the stovaine will not be injected into the sac; the fine cannula by projecting one millimetre beyond the point of the needle ensures that the injection is intrathecal.

The injection should be made in the second or third lumbar interspinous space whether the analgesia be required for high (abdominal) or low (perineal) work. The reason for choosing these two spaces is that the cord sometimes descends as low as the first space which should therefore be avoided, whilst below the fourth lumbar spine the injection is somewhat difficult, and in addition the theca is narrower at this point and may be missed. The injection should be made in the middle line unless the spines are too close together from over-development in muscular individuals or from some deformity. In such cases the lateral route is chosen. With median injection the large posterior internal vertebral plexuses which run longitudinally on the surface of the dura a little to each side of the middle line are avoided. The series of transverse venous rings which join the plexuses are placed opposite the vertebral bodies and so are out of harm's way with either method of injection. Median injection also avoids the nerves of the *cauda equina* to a large extent, as these are disposed in two leashes one to each side. It will be seen from Fig. IV. that these two bundles do not diverge until opposite the upper part of the body of the third lumbar vertebra, that is, opposite the second interspinous space. It is said of course that puncture of these nerves or even of the cord is not at all a serious matter, but I think that it is better avoided.

The injection is easiest made with the patient sitting on the side of the table and bending forward, but as will be seen later the injection given with the patient lying curled up on his side is advisable when upper or lower abdominal analgesia is required.

Barker's No. 2 solution containing stovaine 5% and glucose 5% is one of the best to use. Tropacocaine and glucose in the same concentration is also very good.

Ampoules holding 2 c.cm. of solution are the most convenient as they contain 10 centigrammes of stovaine. Since in some cases as much as 7 centigrammes of stovaine are required the 1 c.cm. ampoules (containing only 5 centigrammes) are too small for general use.

The ampoules are sterilized by immersion in alcohol. It is well known of course that the needles,

syringe and cannula must be boiled in distilled water in a small sterilizer reserved for the purpose. The slightest trace of alkali tends to split up stovaine.

The Production of Analgesia at Various Levels.

(1) Renal and Upper Abdominal Operations.

As I have already indicated I consider that spinal analgesia is as a rule best avoided for operations above the umbilicus. This is chiefly on account of the undesirably great fall in blood pressure when the upper thoracic nerve roots are anæsthetized. The patients in whom spinal analgesia is used are generally very weak from one cause or other and while they can stand a moderate fall in blood pressure fairly well, too great a fall may be dangerous. The blood pressure fall in lower abdominal as well as upper abdominal analgesia is due first of all to the loss of tone in the great muscular masses of the lower limbs and lower abdomen with consequent withdrawal of support to the enormous vascular areas in these regions; in addition there is vasomotor paralysis. It is also likely that as the periphery of the lower part of the body is insensitive, the cutting off of the normal reflex tonic stimuli from the skin to the vessels further increases the blood pressure fall.

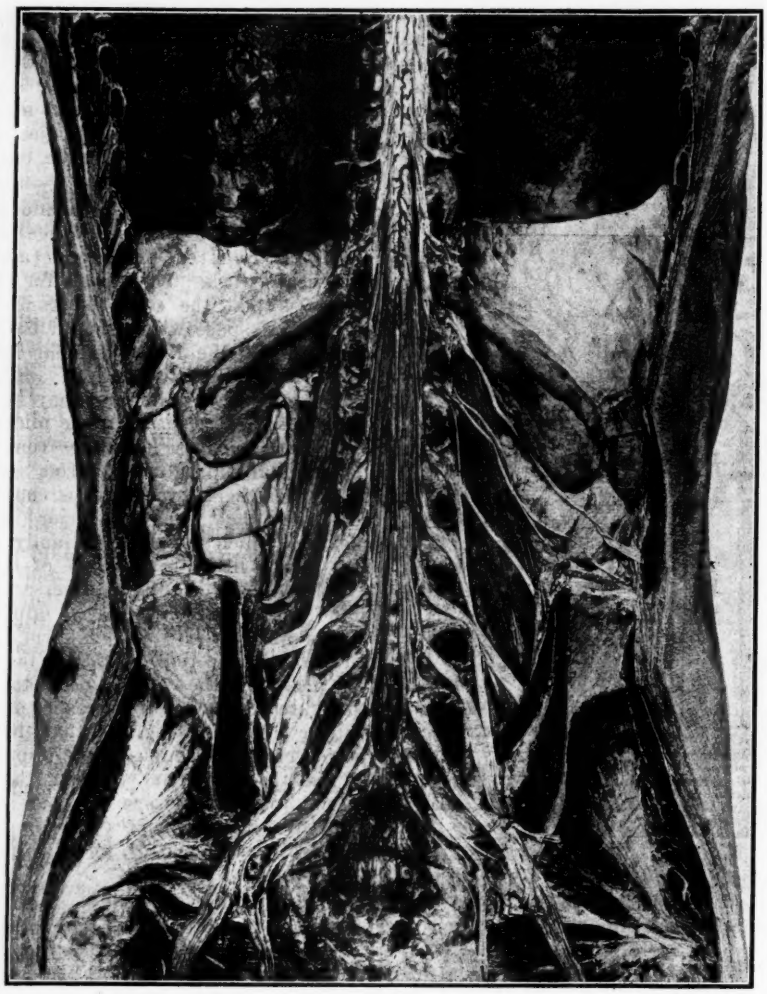


FIGURE IV..

Photograph of a Dissection of the Back of the Trunk, in the Museum of Anatomy, Medical School, Sydney University. Opposite the body of the third lumbar vertebra the *cauda equina* separates into two leashes. The nerve strands are less likely to be pricked when median injection is employed.

The second element in the causation of this phenomenon is splanchnic paralysis. The splanchnic nerves are formed by fibres from the fifth to the tenth thoracic sympathetic ganglia, but some of the uppermost fibres can really be traced in the sympathetic cord as far as the first thoracic ganglion and so to the corresponding nerve root. As the analgesic agent rises in the thoracic part of the vertebral canal there is a correspondingly greater fall in blood pressure from increasing splanchnic paralysis.

Frank Kidd, urinary surgeon to the London Hospital, has made the following observations (verbal communication): The systolic blood pressure was measured as the analgesia rose above the twelfth thoracic segment; it was noted that for each segment above the twelfth thoracic the blood pressure fell by 10 mm. of mercury, but as soon as the effect surmounted the seventh segment there was a sudden fall of about 40 mm. as a rule. At this point the patient became pale and very slightly cyanosed, with faintness, transient nausea and retching. This phenomenon is commonly seen, but is rarely serious and only transient; it constitutes, however, some danger to the patient if he is very debilitated. With carefully regulated analgesia for subumbilical operations, the blood pressure fall is much less, as only the lower splanchnic fibres are paralysed.

The technique for renal or upper abdominal work is as follows: The injection is made with the patient lying curled up on his side. If the operation site is to one side the patient should lie on that side. By means of low pillows under the head and hip the patient is so postured that the third thoracic spine is the most dependent point of the vertebral canal which slopes upwards on the cephalic and caudal sides of this point. The stovaine is injected in the lumbar region and by force of gravity falls from the point of injection to the region of the third

thoracic spine. This can be followed, as it were, by commencing almost at once to prick the patient with the needle from the point of puncture upwards towards the neck. It is surprising to note how quickly the analgesia rises; in a minute or two it has reached almost to the third thoracic spine. Now the patient is rolled gently on to his back; the same low pillow is kept under the head, but a thick pillow or sand bag is placed under the buttocks. The surgeon may at once proceed to the preparation of the operation site and in about 4 to 7 minutes from the time of injection the patient is ready for the incision. At the end of 4 minutes most of the stovaine is fixed to the nerves with which it has been in contact. In renal operations the patient may be kept on his side during the whole of the 4 minutes and then turned over on to the other side so that the renal incision in the analgesic flank may be made. By adopting this careful technique the stovaine is used to its fullest advantage; it quickly runs away from the sacral and lumbar nerve roots and exerts most of its effect on the middle thoracic region of the cord. It is most important to keep the patient on his side in the special posture above described until the analgesia reaches almost to the third spine. If it does not reach so far in about 2½ minutes at the most the patient's head should be lowered at once and his buttocks raised. If this is not done quickly most of the stovaine becomes fixed at too low a level, and an insufficiently high analgesia results.

(2) Lower Abdominal Operations.

As in the preceding group of cases it is advisable to inject the patient lying on his side. If the sitting posture is used some of the stovaine is wasted by falling caudally before the patient is postured on his back. The technique is similar to that described in the last section, except that the sixth thoracic spine is made the bottom of the curved vertebral canal. In the case of prostatectomy or other operations involving any manipulation of the bladder base it is well to insure adequate anæsthesia of the sacral nerves. These nerves will be more effectively bathed by the stovaine on its way upward to the mid-thoracic region by making the injection in the third (or even fourth) space, and by raising the caudal end of the spine just sufficiently for the gravitation of the stovaine and no more.

(3) Perineal, Urethral and Intravesical Operations.

Under this heading are also included anal operations. The patient is injected sitting up on the side of the table. He is made to lean forward a little. A mistake commonly made is directing the point of the needle in too cephalic a direction. Only a minimum amount of stovaine need be used but this point will be referred to later. The patient is kept sitting up for three to four minutes—the fixation period of the stovaine. The "saddle area" and the small areas of the lower limb supplied by the sacral nerves are the only parts of the skin which are anæsthetized. No paralysis of the lower limbs occurs. After the stovaine is fixed the patient may be placed in any position, even the Trendelenburg, and the height of the analgesia will scarcely rise at all.

(To be Continued.)

LOCAL ANÆSTHESIA.[1]

By **Hugh R. G. Poate, M.B., Ch.M. (Syd.), F.R.C.S. (Eng.),**
Honorary Assistant Surgeon, Royal Prince Alfred Hospital; Honorary Assistant Orthopædic Surgeon, Royal North Shore Hospital; Orthopædic Surgeon, Prince of Wales Hospital, Sydney.

By the term "local anæsthesia" one means a temporary physiological break or "blocking" in the nerve conduction from a certain area of the body whereby the sensations of pain, pressure, heat and cold are lost in that area, due to these afferent impulses being unable to reach the cerebral cortex.

In general anæsthesia where the effect is produced by the drug acting on the cerebral cortex alone, there is no break in the afferent track from surface to centre, so that these harmful stimuli still reach the brain and result in the exhaustion of the cortical cells and the production of what we call surgical shock.

Working on this hypothesis Crile has developed his technique of anoci-association for the prophylaxis of shock. He eliminates all adverse factors which tend to produce exhaustion of the central nerve cells particularly, and also of the cells of the adrenal and thyreoid glands and the liver, which is brought about by a conversion of their potential energy into a harmful kinetic energy at the expense of the chemical compounds stored in these cells. The greatest care is taken to eliminate all harmful stimuli both physical and traumatic, before, during and after the necessary operation.

Attention has been drawn to this matter as a clear conception of anoci-association is demanded of any surgeon desiring to practice local anæsthesia with success.

A second important factor for success is the necessity of handling the tissues with the utmost care and reverence. Sir Berkeley Moynihan has remarked that:

> There are some surgeons who operate upon the "canine" principle of savage attack, and the biting and tearing of tissues are terrible to witness. These are they who operate with one eye on the clock and who judge the beauty of any procedure by the fewness of the minutes which it has taken to complete. There are other surgeons who believe in the light hand, who use the utmost gentleness and who deal lovingly with every tissue that they touch.

We may class the former as "operators" who glory in their own personal achievement as a factor apart from the patient's welfare, whereas the latter may be termed "surgeons" in verity as obtaining their satisfaction from as complete a restoration of their patient to the normal as the local circumstances allow. Operators as a class have but scant success with local anæsthesia and usually declare it as not worth the while, whereas the surgeons, being usually men of careful thought and patience, are masters of the procedure.

The third factor for success is a sound and practical knowledge of the peripheral nervous system which, combined with the adoption of a careful technique, gives one the confidence necessary for all requisite manœuvres.

There are few, if any, of our profession who would confess to a lack of knowledge concerning local anæs-

[1] Read at a Meeting of the New South Wales Branch of the British Medical Association on April 29, 1921.

thesia, but one wonders how many there are who regard it as being anything more than "squirting in a bit of solution and nicking out a bit of tissue."

Types of Local Anæsthesia.

There are three different ways in which local anæsthesia may be induced by the injection of an analgesic solution.

First, the effect may be produced by acting on the terminal branches (and possibly the end-organs) of the sensory nerves in an organ, most commonly the skin. This is known as "terminal anæsthesia."

Second, the effect may be brought about by anæsthetizing the sensory nerve trunk itself in its course to the organ, either by injection around the nerve (perineural) or by injection actually into the nerve (endoneural). This is termed "regional anæsthesia" and it may be perceived readily that a large area can be rendered insensitive by the injection of a far less quantity of solution than if the same area were dealt with by terminal anæsthesia.

Third, we have in "spinal anæsthesia" an advance on regional anæsthesia by injecting the solution direct into the sub-arachnoid spinal space and thereby producing anæsthesia in the nerve roots as they leave the spinal medulla and before their exit from the spinal canal. By the injection of about 1 c.cm. of appropriate solution a complete sensory and motor paralysis from the clavicles downwards may be induced with impunity.

Spinal Anæsthesia.

As this method has already been discussed by the previous speaker very little need be said here except that in a personal experience of the method during the past eleven years in a great number of cases, practically complete success was obtained in all and there were no after-effects or complications. The operations performed include most abdominal conditions from stomach and gall-bladder downwards. The longest time taken was 1¾ hours for a case of extensive varicose veins in both legs. The solution used has been that evolved by Barker, *viz.*, stovaine 5%, with glucose 5% in distilled water. The amount injected was from 0.5 to 1.5 c.cm.. This solution has a specific gravity of 1,030 as compared to that of cerebro-spinal fluid, 1,007. Thus the level of anæsthesia may be obtained by tilting the pelvis and so curving the spinal column immediately after making the injection, that the heavy fluid will flow proximally from the point of injection. With a little practice the level of anæsthesia may be regulated to a nicety. As stovaine becomes "fixed" within a very short period the patient may be placed in the Trendelenburg position if required in from 20 to 30 minutes after injection. Anæsthesia should appear in from 4 to 6 minutes and be complete within 15 minutes. Stovaine is the most powerful motor paralysant of all the drugs used in local anæsthetic work, so is particularly well suited for use in the surgery of the acute abdomen. A preliminary hypodermic injection of morphine with atropine is of advantage in most cases to allay any mental excitement and if the patient be a poor surgical risk, it is as well to administer 1.0 c.cm. of pituitrin either just before or soon after commencing the operation,

Terminal and Regional Anæsthesia.

A great number of drugs have been used in this work in recent years. Prior to their introduction attempts were made to produce a sensory paralysis by the firm constriction of a digit or extremity, but insensibility by this method can be produced only by pressure severe enough to actually damage the nerve trunks. The application of cold has long been used to render the skin insensitive, in the way of an ice and salt mixture in a gauze bag or by spraying with ether or ethyl chloride. By these means the skin can be frozen and the terminal branches of the sensory nerves become paralysed. This process is attended with some pain, particularly in inflamed tissues, and after thawing some hyperæsthesia may persist for a short while. If of short duration this freezing does no harm to the tissues, but if prolonged, gangrene may ensue.

Chemical Local Anæsthetics.

Of these *Cocaine* was the first to be introduced in 1884. I believe Dr. F. Antill Pockley brought some to Sydney soon after this and performed the first operation done here under local anæsthesia. Cocaine has played a very important part in local anæsthesia, forming as it did the basis of practically all local anæsthetic solutions offered to the profession until comparatively recently. Of late years it has been discarded very largely for other substances of a lower degree of toxicity and very few use it to-day for producing anæsthesia by injection. The time is not far distant when its use for this purpose will be entirely given up, for it has served its day and there is no reason for retaining it when we have at our disposal many other drugs of equal efficiency and of far less toxicity. Cocaine is not only a treacherous drug with a special affinity for the central nervous system, but is a direct protoplasmic poison. There are very few men of any experience who have not witnessed ill-effects from its use. It is extremely difficult to judge the dose which different persons can tolerate without displaying toxic symptoms, and this is apart from the fact that many folk possess a definite idiosyncrasy towards this drug. Solutions of cocaine cannot be sterilized by boiling as the drug becomes disintegrated, and a similar change occurs in solution kept for a time, and also in the presence of even small amounts of alkali. It is true that if used in conjunction with adrenalin, the risk of producing toxic symptoms is very greatly lessened, but with the many efficient substitutes at hand the patient should not be subjected to even a small risk. Personal experience has shown that the following are the most suitable drugs for general use.

Novocain, introduced in 1905, was "made in Germany," but is being produced in the United States of America now under the name of "procain." It is a synthetic compound and more nearly reaches the standard of the perfect drug for local anæsthesia than any other on the market except perhaps apothesine. It is neutral in reaction, soluble in equal parts of water, slightly antiseptic in action, can be boiled repeatedly and may be kept in solution for months without any apparent decomposition, a property not possessed by any of the other drugs. However, it is decomposed in the presence of alkalis. It has no effect

on the respiratory or circulatory centres and is absolutely non-irritating to the tissues. Repeated injection may be made without any untoward effect developing, such as hyperæmia, inflammation, after-pain or any toxic symptom, provided an isotonic vehicle is employed. Instilled into the conjunctiva it does not interfere with accommodation, has no mydriatic effect and does not increase intra-ocular tension. A 2% solution produces about the same result as 0.5% cocaine, but as much as 450 to 500 c.cm. of this 2% solution has been injected without harm. It is slower in action than cocaine and as it has a slight vaso-dilator action, should always be used in conjunction with adrenalin (or an efficient substitute) As with most other local anæsthetic drugs adrenalin augments the action very markedly and also prolongs the duration of the anæsthesia. On mucous membranes a 20% solution may be used or even the pure crystals may be applied, but about ten minutes is required for the full effect to be produced. It may be used for urethral injections in combination with silver salts in solutions of 1% to 4%. For regional anæsthesia 1% to 2% is the best strength, but for the infiltration method 0.5% is quite enough provided the necessary few minutes be allowed for the requisite effect to become established.

Beta-eucaine is a fairly good anæsthetic agent, but is slightly irritating to the tissues when injected and is markedly so in the eye. It can be boiled in solution and although much less effective than cocaine, is certainly much less toxic. It has a solubility of 3.5% in water, but 0.5% is strong enough for ordinary work. The combination with adrenalin is not as effective as is the case with other drugs. Eucaine lactate exhibits much the same properties, but has a solubility of 22% in water.

Apothesine is one of the newer synthetic drugs and in its properties is very similar to novocain. It is readily soluble, forms a neutral solution, stands boiling and keeps well in solution. It is used in strengths varying from 0.25% to 10%, but for general use 1% is enough. It should always be used in conjunction with adrenalin for the enhanced effect which this drug gives.

Holocaine is a good anæsthetic for eye work but is unsuited for subcutaneous injection as it irritates the tissues and may produce toxic effects.

Tropacocaine is another good local anæsthetic for eye work. It is said to have only one-half the toxicity of cocaine, to be quicker in its action and to retain its anæsthetic effect twice as long. In the eye it produces a very rapid anæsthesia with no ischæmia and without producing any impairment of accommodation. It should not be used with adrenalin as it neutralizes the action of this drug.

Quinine and Urea Hydrochloride in ½% solution may be boiled, but if left standing for any length of time, it will decompose. It is remarkable for the prolonged anæsthesia induced, but is slow in action. The urea is combined with the quinine to render the latter more soluble, as quinine hydrochloride has a solubility of only 1 in 34 of water, whereas the combination is readily soluble. When injected it causes an exudate into the tissues which soon coagulates but is absorbed in a few days, when the tissues resume their normal state. If injected deeply and allowed to remain, this coagulation may go on to fibrous tissue formation with an anæsthesia lasting many days. If combined with adrenalin, there is less exudate and a shorter period of anæsthesia. It is non-toxic, but the quinine arrests the amœboid movement of the white corpuscles. On account of these properties it should be used with caution in any deep nerve blocking for the production of a regional anæsthesia. Because of the prolonged anæsthetic effect it is useful for such conditions as thrombosed external hæmorrhoids and fissured anus.

The Action of Adrenalin.

Adrenalin or synthetic suprarenin should be used with all local anæsthetics on account of the enhanced effect produced. Since this substance is a vaso-constrictor it prevents any rapid absorption of the drug and thus reduces the potential toxicity. In addition the action is intensified since the drug is held in the tissues for a longer period and the duration of anæsthesia is prolonged from three to ten times as much. Also there is less hæmorrhage. About 0.25 c.cm. of a 1 in 1,000 solution in each c.cm. of injection fluid is the best amount to employ, but should be used with caution in all cases of high blood-pressure, in mitral or aortic insufficiency, and in subjects with diabetes or exophthalmic goître. The maximum subcutaneous dose should not exceed 0.75 c.cm. of a 1 in 1,000 solution of adrenalin, so as to avoid toxic effects.

It is worthy of particular note that tropacocaine almost quite nullifies the action of adrenalin, while with beta-eucaine and stovaine the anæsthesia is only slightly enhanced by the addition of adrenalin. On the other hand the action of novocain is enormously increased, as is that of apothesine.

The Elimination of Anæsthetic Drugs.

This is accomplished almost entirely by their destruction in the liver. All the drugs in general use are rapidly eliminated except cocaine and holocaine, which are got rid of comparatively slowly and thus are more liable to produce toxic effects even in small dilution, since their elimination is not rapid enough to keep pace with their absorption from the injected area.

It has been shown experimentally that all these drugs kill by a simultaneous paralysis of the cardiac and respiratory centres. The employment of artificial respiration along with stimulation of the heart by intravenous injection of adrenalin solution brought about resuscitation in animals even after the use of doses up to twice the average fatal amount. Massage of the heart is necessary as well so as to ensure the adrenalin reaching this organ. The success of resuscitation depends on the rapid destruction of the drug, whereby the excess in the circulation is eliminated if the circulation can be maintained for the time being, and also artificial respiration be continued, until the paralysed centres recover.

In cases of acute poisoning in man these measures should be borne in mind and may prove successful except in cases of marked susceptibility when the dose given—as compared to the average—may be relatively several times the minimum toxic dose for that individual. Again it must be noted that adrenalin

should always be used in order to inhibit absorption and so render it more likely that the liver can keep the amount present in the circulation at any one time at a point below that sufficient to cause toxic symptoms. Also, combined with adrenalin a smaller amount of drug can be injected on account of the enhanced action.

Technique.

It is necessary to have at hand several syringes with an adequate supply of well-fitting needles. If one is doing a fair amount of this work it is advisable to have syringes of the "record" type capable of holding 1 c.cm., 2 c.cm., 5 c.cm., 10 c.cm. and 20 c.cm., with fine needles of various length, but all of them having a short bevel. Platino-iridium needles are the best, even though they bend easily and are blunt, as they are readily sterilized and do not rust or corrode, but with care the ordinary steel needles give very satisfactory use.

The needle should never be inserted for its full length as the common place for them to break is at the junction with the base, and if this does occur, it may be difficult to recover unless care be taken to have about 1 cm. of needle showing outside the tissue.

As all the local anæsthetic drugs are precipitated by alkalies, it is very necessary to see that needles, syringes, measure glasses, etc., used in making the solution, are sterilized in plain water and then rinsed in saline before using. Neglect of this small point on one occasion led to very unpleasant after-effects when using stovaine for special analgesia.

With regard to the solution it must be remembered that distilled water is hypotonic and results in expansion of tissue cells and of red blood corpuscles, causing soreness, swelling and post-operative pain. Ringer's solution is best, or else freshly prepared normal saline solution. Neither should be kept in stock solution as they become hypotonic by evaporation of the water, either as a result of standing or on boiling during re-sterilization.

It is contrary to the principle of good practice to add morphine to any anæsthetic solution. It has no local anæsthetic effect and it may be difficult to determine just how much has been given and how much is absorbed. If it is used at all, give it one-half to three-quarters of an hour before the operation. In very nervous subjects a preliminary hypodermic injection of 0.0003 gramme of scopolamine with 0.0075 gramme of morphine and 0.0004 gramme of atropine is an excellent sedative. The solution should be injected slowly, the optimum rate being about 1 c.cm. in 20 seconds. It must be remembered that the toxicity of a local anæsthetic is dependent to a large extent upon the rapidity with which it enters the circulation, so that if a large quantity is to be injected it should be done slowly to avoid any risk of producing toxic symptoms.

The largest nerve trunks have the thickest and most fibrous sheaths, so are not as permeable to the anæsthetic solution as the smaller branches approaching the terminal distribution. The terminal branches have practically no sheaths, so from this it follows that an organ having only terminal branches of nerves and their end-organs is the one most easily rendered insensitive, *i.e.*, the skin. Next in order comes periosteum and then perhaps the parietal serosa of thorax and abdomen, all of which are easy to thoroughly infiltrate. In major operations perhaps the easiest in which to produce an infiltration anæsthesia is that for a laparotomy in the mid-line of the abdomen. In doing this the first injection should be made deep to the rectus sheath, then into the *linea alba* and finally subcutaneously. It is not necessary to infiltrate the skin, as a block anæsthesia of the nerve trunks is achieved if this technique be followed. The operation may be commenced within 10 to 20 minutes after completing the injection.

In planning a local anæsthesia one must have a clear conception of the topographical anatomy and especially of the nerve anatomy of the region, and also of what steps will be necessary in the operation. The question of endoneural or perineural injection must be considered as against an infiltration of the whole operative field either *in toto* or by circular injection.

Because of the unequal distribution of the sense of pain within the tissues and organs, it is often possible to perform large parts of an operation painlessly. This is particularly true of manipulation within the abdomen, provided no strain is put on the retro-peritoneal tissues by dragging on the mesentery or by other injudicious manœuvres.

As a general working rule it may be stated that all internal organs receiving their nerve supply only from the sympathetic and the vagus below the branching off of the recurrent nerves, have no sensation; also that bone denuded of its periostum is also painless.

Local anæsthesia enables the un-assisted surgeon to practice successfully all kinds of minor operations and in an emergency may well be a life-saving measure in such cases as tracheotomy, cystotomy, herniotomy, thoracotomy, etc..

Finally, local anæsthesia practised with intelligent care will cause the surgeon to operate with anatomic conservation and accuracy and will teach him to respect not only his patient's feelings but, what is more important, his patient's tissues, which show their gratitude for kindly and respectful handling by their rapid healing with absence of cicatricial tissue.

SOME MODERN METHODS OF GENERAL ANÆSTHESIA.[1]

By **M. C. Lidwill, M.D. (Melb. et Syd., ad eundem gradum),** *Honorary Assistant Physician, Royal Prince Alfred Hospital, Sydney; Honorary Physician, Mater Misericordiæ Hospital, North Sydney.*

I have been asked by the Organization and Science Committee of the British Medical Association to contribute a paper on anæsthesia, so I have selected for my subject "Some Modern Methods of Anæsthesia."

Before describing these methods I would like to point out certain factors which contribute to the success of an anæsthetic.

The most important factor is a knowledge of the pharmacology of the drugs that are being administered. One does not want to be like Voltaire's physi-

[1] Read at a Meeting of the New South Wales Branch of the British Medical Association on April 29, 1921.

cian, namely, a man who pours drugs of which he knows nothing into a body of which he knows less. I am sorry to say this is often the case.

The anæsthetist should next consider what he really is. He is in fact a necessary evil. He does not cure the patient but only dulls the patient's senses so that the surgeon can do his work. He is to the surgeon what the vice is to the mechanic, namely, something to hold the part from moving while it is being fashioned into shape. Like the vice he must see that the part is not damaged by excessive tightness or wobbling about from slackness of grip.

When choosing an anæsthetic the anæsthetist should consider the following points:

(1) What will give the maximum safety to the patient during and after the operation?

(2) What will give the maximum convenience to the surgeon?

(3) What will give the least inconvenience to the patient during the induction and after the anæsthetic?

Preliminary Medication.

Preliminary medication is often used but is objected to by some surgeons. After a considerable trial I have come to use 0.0075 gramme ($\frac{1}{8}$ grain) of morphine and 0.0004 gramme ($^1/_{150}$ grain) of atropine to any patient who is at all nervous, providing he is over 18 or under 50 years of age. I have never seen any trouble that I could say was definitely due to this small dose of morphine, but when larger doses have been administered there has been from time to time a definite tendency to respiratory failure greater than would have been found if no morphine had been given. One should remember that the size of the pupils is different when these drugs have been given. The pupil should always be kept small except in a few exceptional cases where the effect of the atropine on the pupil is more marked than that of the morphine. Hyoscine is used by some, but I do not think that it is safe to use it. I have seen trouble where this drug has been given.

For those that do not like to use preliminary morphine in nervous cases Gwathmey's suggestion of 3 to 7 c.cm. each of paraldehyde and potassium bromide dissolved in 114 c.cm. of water and given 40 to 60 minutes before the operation as an enema is very useful and is perfectly safe.

Methods of Induction.

I will now describe the two methods that I have found to be the least objectionable to the patient.

Oil of Bitter Orange and Ether Sequence.

A few drops of a 25% solution of oil of bitter orange in spirit is sprinkled on the mask and inhaled for two or three minutes. This will considerably eliminate the smell of the ether and is undoubtedly followed by a calm induction in the majority of cases. Personally I have found it satisfactory.

Ethyl Chloride and Ether Sequence.

This is a most satisfactory routine providing certain precautions are observed.

(1) With little children only a few drops of ethyl chloride are required, just enough to stop the crying. The administration of the ethyl chloride should never be carried beyond this when the operation following is going to cause a blockage of the air-way, as in certain methods of removing tonsils.

(2) With other cases the ethyl chloride anæsthesia should not be taken too far. Personally while using the ethyl chloride I talk to the patient and get him to answer questions. As soon as he stops answering I administer a few drops more and wait about 8 or 10 seconds and then commence to administer the ether.

Maintenance of Anæsthesia.

This is either even or fluctuating in intensity. I have found that after the anæsthesia has been even there has been considerably less post-operative vomiting. An absolutely even anæsthesia is only to be obtained by mechanical means as it is impossible to pour out of a bottle an even flow of fluid; or supposing that it were possible, the patient's respirations vary from time to time, making an even anæsthesia impossible. Mechanical anæsthesia has also other advantages. It reduces abdominal movements to a minimum, or if the surgeon is working in the region of the head and neck, the anæsthetist can remain out of the way.

Mechanical anæsthesia was first introduced into this country by Dr. Piero Fiaschi. The great trouble at that time was the enormous size and weight of the machinery required. After a series of experiments I have been able to make an efficient machine weighing about 7 kilograms (15 lbs.) which packs away easily into two small hand bags. The principle of the machine is that air is delivered by a compressor to a carburettor by means of which any desired strength of ether vapour may be obtained. With regard to heating of the mixture that is being delivered to the patient, personally I have found no benefit from it and theoretically it is wrong.

There are three ways in which the ether may be administered by mechanical means, namely, (*i.*) oral; (*ii.*) intra-pharyngeal; (*iii.*) intra-tracheal. In all three the patient is anæsthetized by the ordinary methods.

For the oral method a Hewitt's artificial air-way is introduced into the mouth and a small tube from the machine passed into the air-way. A towel is thrown over the mouth and nose and the carburettor is set to the desired depth of anæsthesia when it will seldom have to be altered during the anæsthesia.

For the intra-pharyngeal method a couple of catheters are passed down the nostrils for about 10 cm. and connected with the machine.

For the intra-tracheal method a No. 13 or No. 14 Belfast linen catheter is passed through the vocal cords well down into the trachea and connected with the machine. To pass the tube I have found Chevalier Jackson's direct laryngoscope the best. The patient is deeply anæsthetized and laid absolutely horizontal, the laryngoscope is passed into the mouth and the epiglottis is looked for. This is hooked up, when the cords will generally come into view. If not, the larynx should be gently pressed on from the outside.

With regard to the safety of this method of anæsthesia I can honestly say that after having given be-

tween two and three thousand of these anæsthetics I have only met with trouble once, in a patient with a patent *foramen ovale* who went blue as soon as the pressure was raised in his lungs on account of the short circuiting of the blood through the foramen. As soon as the tube was removed the patient got alright. There has been only one case followed by pneumonia. This patient I regret to say was brought on to the table with a temperature of over 37.8° C. and neither the surgeon nor myself was notified. Five hours after the operation the temperature was 40° C. and there were signs of pneumonia in the chest. I do not blame the anæsthetic for this as the patient had pneumonia when she was operated upon.

With regard to all the other cases they have given no trouble after or during the anæsthesia, and I do not think that there has been 5% of post-operative vomiting.

Before leaving this subject I should like to mention that intra-tracheal air is the most efficient method of artificial respiration, and I am certain that if this were done when patients were seized with respiratory failure, fewer deaths would take place during anæsthesia.

I have not time to tell you about the cases where intra-tracheal anæsthesia has made possible surgical procedures that would otherwise have been impossible, *e.g.*, chest operations.

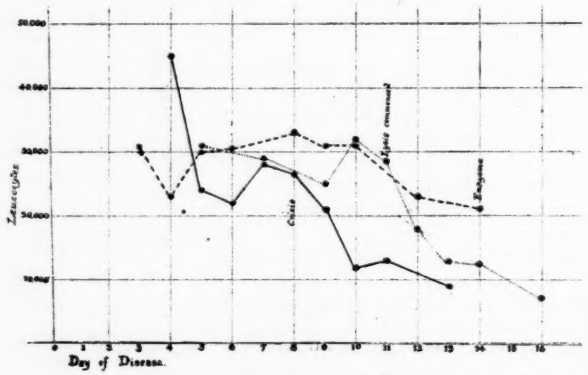
OBSERVATIONS ON THE BLOOD CONDITIONS IN ACUTE PNEUMONIA.

A Preliminary Report.

By **H. F. Maudsley, M.D.,**

Clinical Research Scholar, Walter and Eliza Hall Institute for Research in Pathology and Medicine, Melbourne.

The following investigations were carried out in 27 cases of acute lobar pneumonia in patients admitted to the Melbourne Hospital from August to November, 1920.



(1) A daily leucocyte count, from the day of admission to the supervention of convalescence, showed a gradual fall to within normal limits on about the tenth to fifteenth day after the onset. This gradual fall took place both when the temperature fell by crisis and by lysis. In cases complicated by empyema, this fall did not occur, even though the temperature had dropped. In two cases this complication was foretold before the physical signs made their appearance. (See Graph.)

In cases taking a favourable course a leucocyte count of 20,000 to 30,000 was most frequent.

(2) Differential leucocyte counts showed a great relative increase of polymorphonuclear type of cells (85%-90%). As convalescence approached, the disproportion between these cells and the lymphocytes disappeared. I could find no evidence that any particular type of pneumococcus made any alteration in the differential count.

(3) Percentage of hæmoglobin in the veins compared with that in the capillaries. This research was undertaken to discover if in bad cases there was a concentration of blood in the capillaries; in other words, if a condition resembling shock occurred in the clinically worse types of pneumonia. There were too few very severe cases in the series to enable me to come to a conclusion. In the milder cases the difference found was within the range of experimental error.

(4) Arneth counts. In pulmonary tuberculosis McDougall[1] considers that a relative increase of polymorphonuclear leucocytes with one or two lobes in the nucleus, indicates an ebbing immunity. In a series of Arneth counts in these cases of pneumonia, I found that in fatal cases there was a definite relative increase in one- and two-lobed polymorphonuclear cells as compared with infections that terminated in recovery. The presence of the more immature types of cell may be of some use in prognosis.

Arneth Counts.

Case.	Percentage of Polymorphonuclear Cells With 1 Lobe.	2 Lobes.	3 Lobes.	4 Lobes.	5 Lobes.	Result.
V.	13	40	33	10	4	Death
XV.	28	52	17	3	0	Death
XX.	26	46	23	5	0	Death
XXVII.: 2nd day	6	34	38	19	3	
6th day	2	24	48	20	6	Recovery
XXIV.	5.5	28	40	24	2.5	Recovery
XXI.: 3rd day	2	25	37	24	12	
7th day	2.5	28	45	22	2.5	Recovery
XIX.: 4th day	2	23	50	22	3	
6th day	3	16	38	38	5	
8th day	5	26	45	20	4	Empyema

RECEIPTS FOR PAYMENTS BY FRIENDLY SOCIETY LODGES TO MEDICAL OFFICERS.

The Medical Politics Committee of the Council of the New South Wales Branch of the British Medical Association desires to inform medical officers of friendly society lodges in New South Wales that the Commissioner of Stamp Duties, in reply to a question by the Committee, has stated that receipts given by medical officers for payments of £2 or upwards made for or on account of attendance on lodge members, are not exempt from stamp duty under the *Stamp Duties Act, 1920*, No. 47.

A notice appears in the *New South Wales Government Gazette*, No. 80, of June 23, 1921, that William George Armstrong, Esq., M.B., Mast. Surg. (Univ. Sydney), D.P.H. (Univ. Camb.), has been appointed President of the Board of Health from May 1, 1921.

[1] McDougall, *Lancet*, August 21, 1920.

The Medical Journal of Australia.

SATURDAY, JUNE 11, 1921.

Anæsthesia.

In our issue of May 21 a series of articles on anæsthesia appeared. In this issue we publish a further series. The authors have varied widely in their choice. Ether anæsthesia, mechanical anæsthesia, gas-oxygen anæsthesia, rectal anæsthesia, spinal analgesia and local anæsthesia have all been discussed. Local anæsthesia for minor surgical procedures and general anæsthesia by means of chloroform or of ether by the open and closed methods have long since been promoted to an accepted place in the routine practice of the profession. The others have not found such general support. Spinal analgesia for the performance of major surgery has here and there an enthusiastic protagonist, but the majority of anæsthetists and surgeons have not made use of this method. As a routine procedure it has little to recommend it. Intra-thecal injection is not always an easy operation and the details of technique are only mastered after considerable experience. Moreover, the prejudice against operating on a conscious patient is general and in most instances justifiable. When general anæsthesia is contra-indicated, the alternative of spinal analgesia presents itself for consideration in operations on the lower extremities and lower abdomen. Except in selected cases, however, it is not likely to be practised. Rectal anæsthesia finds few advocates and less who are desirous of putting it into practice. If, as is frequently stated, ether anæsthesia by the ordinary methods is open to the objection that there is no scientific accuracy of dosage, the same objection has much greater force in the case of rectal anæsthesia, since we are ignorant of the rate of absorption of ether vapour from the bowel and there is no ready means of removing the anæsthetic during an emergency. Dr. R. Howden has treated the subject in an admirably unprejudiced fashion and the temptation to try rectal anæsthesia after reading his summary is not great. Nitrous oxide-oxygen anæsthesia will find more support. During shock following the severe trauma of war wounds, even when the blood pressure is very low, nitrous oxide is an anæsthetic which can be administered with comparative impunity. Such was the experience during the recent war. But nitrous oxide is by no means the ideal anæsthetic in general surgical practice. The muscular rigidity which persists in spite of all attempts to abolish it, the rapidity with which the patient comes to and feels the full rigour of post-operative pain and—perhaps most potent consideration of all—the costliness of the method and the cumbrousness of the apparatus, destroy its utility as a common means of anæsthesia. In selected cases and in capable hands it has its advantages. Probably it will in the future be a more common resort of the anæsthetist than it has been hitherto.

Mechanical anæsthesia, formerly known as Meltzer's intra-tracheal insufflation method, has come to stay. When first introduced to Australia some seven years ago the new method was received with considerable reserve. This was largely due to the fact that no little difficulty was experienced in passing the intra-tracheal catheter between the vocal cords. With experience and with the substitution of a direct for an indirect laryngoscope the technique became better and simpler. For thyreoidectomy, intra-thoracic surgery and prolonged operations on the head and neck it is an excellent mode of anæsthesia. Its disadvantages are that it requires a costly apparatus, that the preliminary induction must be carried out in the usual way and that constant practice is necessary for its use.

The general practitioner will view the majority of these procedures askance. In his practice chloroform and ether given by the orthodox methods will remain his choice. For ordinary purposes these are sufficient and no method has yet been devised which threatens to exclude them. Anæsthetists, however, are by no means in agreement on the relative advantages of chloroform and ether or of "closed ether" and "open ether." Ether has historical precedence over chloroform and nitrous oxide over ether. The definite discovery of the anæsthetic effects of nitrous oxide was made in 1844 by an American dentist, Horace Wells, and of ether two years later by Moreton, his former

pupil. Flourens in France in March, 1847, advised the use of chloroform for a similar purpose, but it was Sir James Young Simpson, of Edinburgh, who first won the approval of the profession for this anæsthetic. Chloroform became the anæsthetic of general choice, chiefly because of a false and temporary belief in its safety. The elder rival soon competed strongly with her younger sister. The merits of that competition will be adjudged by anæsthetists according to their preferences and education. Scottish graduates cling to chloroform with almost religious devotion. Graduates of Australian medical schools have adopted ether. Ether, comparatively repulsive and comparatively safe, has largely replaced chloroform in public hospitals and in private practice. The chief consideration is the safety of human life and Australian practitioners as a whole have more confidence in the safety of ether than of chloroform. Perhaps the best criterion of a medical man's views on the subject is his own choice when he has himself to submit to anæsthesia. Ether would doubtless claim the far greater number of friends. But ether is not safe. There is no safe means of anæsthesia. The good anæsthetist is ever on the watch for danger signals. The tendency to push him out of the way of the surgeon and to allow him to carry on mechanical anæsthesia at a distance has not everything to commend it. The anæsthetist should be the careful watch dog of his patient. Infinite care and concentrated practice are essential. Outside skilled anæsthetists who make an intensive study of the subject, the best anæsthetists are probably the senior resident medical officers of public hospitals. And they become so by practice, by the exigencies of surgeons who have "long lists" and object to unnecessary delay and by the confidence which is obtained from an impersonal knowledge of the patient. When the resident medical officer leaves hospital, his experience lessens and his art suffers.

But although the majority of the profession in Australia take the side of ether in the controversy, they are by no means unanimous on the question of the method of ether anæsthesia. The "open" method claims more adherents, largely in virtue of the fact that the apparatus for its use is simpler. Probably the actual method matters little. Experience brings expertness, whichever mode is used, and an anæsthetist skilled in the art of open ether anæsthesia finds no difficulty as a rule in anæsthetizing even powerful men.

The subject of anæsthesia still lies on the agenda paper of medical debate. No authoritative pronouncement has been made. Even the careful findings of the Hyderabad Commission on the cause of death from chloroform poisoning have been torn in the fury of controversy. Men of equal judgement will have their individual preferences but will keep an open mind on the subject. Chloroform has many advantages and even its most vigorous opponents make use of it in obstetrics. Probably if students received better instruction in the art of chloroform anæsthesia the number of its opponents would be materially reduced. The anæsthetist who pours chloroform on a mask tightly pressed to the patient's face is courting danger and it is not to the credit of most manuals on chloroform anæsthesia that this necessity of giving plenty of air during the induction is not emphasized. Chloroform is invaluable in obstetrics, in cases of chronic bronchitis and pulmonary tuberculosis and in certain other instances. But as a general anæsthetic, combining the least danger with effective anæsthesia, ether has attained a position from which chloroform will not easily displace it.

IMMUNIZATION AGAINST TUBERCULOSIS.

Since the discovery by Robert Koch of the bacillus of tuberculosis, innumerable attempts have been made to produce immunity to this disease in susceptible animals. The story of Koch's own investigations which culminated in the preparation of old tuberculin, is a long and interesting one. His researches subsequently carried out were also of a highly ingenious nature and the outcome undoubtedly provided important additions to our knowledge of the physico-chemistry of the bacilli. Less fascinating is the history of the origin of the many variations of tuberculin to which each worker attached his own name. Sprengler exercised more originality when he worked out his *I.K.* therapy, although few authorities are now prepared to accept the hypothesis on which this therapy was based. Sprengler's so-called *Immun-Körper* (immune bodies) are certainly not the specific bacterial antibodies that he claimed them to be. Far more fascinating, even if more fantastic, is the drama of Marmorek and his active immunization. Marmorek worked at the Pasteur Institute in Paris. He conceived the idea that the spreading edge of the colonies of tubercle bacilli consisted of young forms which differ from the mature bacteria morphologically, biologically and pathologically. He claimed that he had immunized guinea pigs by

means of increasing doses of these young forms until they were able to resist multiple lethal doses of virulent tubercle bacilli. Roux and Metchnikoff refused him permission to publish his results as emanating from the Pasteur Institute. Marmorek was an enthusiast and a dreamer and preferred to walk out of the Institute and to work in a garret without remuneration rather than relinquish a cherished idea in which he believed implicitly. It mattered little to him when he failed to convince competent and independent critics of his ability to induce a state of immunity in guinea pigs. He found an explanation for each failure, but never lost faith in his method. The medical profession in Paris persecuted him and lay in wait for the day when he would deliver himself into their hands. Notwithstanding the fact that his qualification was not registrable in France, he evaded the traps. Marmorek was self-deluded and mistaken. No one is bold enough to support his some time claim now.

These fragments from the book of bacteriological research must suffice to indicate the degree of caution necessary when a scientist searching for truth and straining to benefit humanity announces the discovery of a new method of immunization against tuberculosis. Professor K. Shiga, of the Kitasato Institute for Infectious Diseases in Tokio, has been working for many years with the object of producing an artificial immunity in animals and in man. He started, as many others have started before him, with the assumption that immunity can be acquired if an avirulent form of bacillus is used. It had been determined that tubercle bacilli could be rendered tolerant to certain aniline dyes and that the surviving bacilli would be thus deprived of their virulence. Glycerine broth cultures were prepared and various aniline dyes were added in increasing quantities to the tubes. Every four to eight weeks fresh sub-cultures were made. Professor Shiga found that trypoflavine inhibited growth at first in a dilution of 1 in 200,000. After training, the bacilli were able to resist the bactericidal action even when the concentration was increased to 1 in 8,000. No other member of this group of dyes yielded results approaching this. Equally striking results were obtained with erythrosin and iod-eosin, members of the fluorescin group. Bacilli trained to tolerate a high concentration of trypoflavine were found to be practically avirulent to guinea pigs, especially after the bacilli had been sensitized by passage through test guinea pigs. In order to increase the power of the animal to absorb the bacilli, he added a small quantity of immune serum to the broth cultures. He then endeavoured to immunize guinea pigs against infection with virulent bacilli. The guinea pigs were given three preventive doses before infection and after infection they received therapeutic doses. In all cases the animals treated with trypoflavin vaccine lived much longer than the control animals and after death their lesions were found to be attenuated. The control animals died within 78 days, while the vaccinated animals survived for from 58 to 176 days. In many cases fibrous encapsulation was found to be marked when the lesions were examined after death.

Stimulated with this measure of success in the most susceptible of all animals to tuberculosis, Professor Shiga determined to strengthen the antigen value of his vaccine by the addition of a substance which would yield strong fixation of complement and at the same time a weak allergic reaction. He was able to determine experimentally that an extract of a broth culture of bacilli trained to tolerate erythrosin possessed both qualities to a considerable degree. He therefore added to his vaccine the filtrate of erythrosin broth after it had been passed through a Berkefeld filter.

It is suggested by Professor Shiga and his coworkers that the human phagocytes, after ingesting the bacilli, cause them to be absorbed by means of a bacteriolytic cytase. The presence of such a ferment has been demonstrated in the case of the leucocytes of the rat. The sero-vaccine would seem to stimulate phagocytosis, to increase the lytic effect and to encourage the proliferation of connective tissue in and around the lesions. These details were published in 1915 and 1916 in a Japanese medical journal and later in the *Archives of Experimental Medicine* of the Kitasato Institute. They have been summarized under Professor Shiga's control in the *International Journal of Public Health* (January-February, 1921).

In the same issue Professor Shiga gives an account of his application of the sero-vaccine in human beings. He has treated children and young adults who have been exposed to tuberculous infection, those who have a "consumptive appearance," those with chronic tonsillitis or chronic cervical adenitis, those who catch cold readily, those who manifest slight fever without apparent cause, especially after moderate exercise and finally those in whom rough or diminished breath sounds are heard at one or other apex. In the course of four years he has treated about 300 persons. Each person received 0.1 c.cm. of a 1 in 5,000 vaccine. The dose was increased in stages to 0.2, 0.3, 0.5 and 0.7 c.cm. of the same vaccine. Then a dilution of 1 in 1,000 was used, of which four spaced doses were given. The next dilution was 1 in 500 and the fourth dilution 1 in 100. In these dilutions, three doses were injected. After 0.7 c.cm. of a 1 in 100 dilution had been given, he passed to a living vaccine diluted twenty times and gave first 0.2 c.cm. and later 0.4 c.cm.. He claims that the general health of all his 300 patients has improved, that all have increased steadily in weight and strength. In none has clinical tuberculosis developed. He claims that of 300 children and young adults exhibiting the suggestive signs mentioned above, a considerable number would have manifested frank tuberculosis within a few years. As all remained free from ascertainable infection, he deduces that his treatment has been successful in instituting a protective immunity. He goes further. He would have all children and young adults showing a tendency to tuberculosis immunized with his sero-vaccine, as he contends that this will result in the suppression of open tuberculosis and thus remove from the community the source of infection. The future must reveal whether his optimism is justified.

Abstracts from Current Medical Literature.

THERAPEUTICS.

(214) Phosphorus in Rickets.

D. B. Phemister, E. M. Miller and B. E. Bonar (*Journ. Amer. Med. Assoc.*, March 26, 1921) report the results of an investigation of the effects of phosphorus in rickets. Röntgen-ray studies of the influence of phosphorus on the growth of normal bones and on the bones in the disturbances of development of *osteogenesis imperfecta* and dyschondroplasia, have shown that a dense shadow formed at the growing ends of the shafts, which gradually increased in thickness as long as the phosphorus was given but gradually faded after the discontinuance of the drug. It was further observed that as longitudinal growth of the shaft proceeded, the dense shadow came to lie at a greater distance from the epiphysis. When the drug was again administered a similar line formed which in turn faded when the phosphorus was stopped and was carried deeper into the end of the shaft with subsequent growth. No influence on the transverse growth of the shaft was observed in normal bones but in *osteogenesis imperfecta* the influence was as striking as on the longitudinal growth. The shadows were found to be due to a layer of densely packed, longitudinally arranged, bony trabeculæ that formed from excessive activity in the zone of ossification at the end of the shaft. The end results produced by phosphorus and the combination of phosphorus and cod-liver oil were quite similar. Rarefied areas of rachitic bones acquired an approximately normal density in both instances. The method of action is little understood. In the case of cod-liver oil the result might be attributed to the presence of fat-soluble vitamine A; but this could not be the explanation for the action of phosphorus. There is a trace of phosphorus in cod-liver oil in organic combination, but it is improbable that it is present in sufficient quantity to exert any influence. It appears evident that phosphorus and also cod-liver oil in some way restore the power of normal ossification which in rickets is temporarily lost.

(215) Pancreatic Extract in Sprue.

T. R. Brown (*Amer. Journ. Med. Sciences*, April, 1921) discusses the pathogenesis of sprue. The disease has long been recognized as a definite clinical entity by writers on tropical medicine. Considerable difference of opinion still appears to exist with regard to the ætiology of the disease, certain authorities contending that it is the result of an infection by a fungus, *Monilium psilosis*, whereas others have maintained that it is in reality a deficiency disease. Whatever the ætiological factors may be it is certain that digestion and absorption are very markedly affected by the pathological conditions produced, the emulsification and digestion of fats being grossly deranged. The author draws attention to the fact that in classical descriptions of the disease little attention has been paid to changes in structure and function of the pancreas occurring in this disease. In a series of five cases recently investigated it was found that the pancreatic ferments—trypsin, lipase and diastase—were constantly greatly diminished in amount or entirely absent from the stools. The administration of pancreatin was found to have been followed by strikingly beneficial results. While admitting that it is impossible to draw general conclusions from such a small number of cases, the author states that there is sufficient evidence to show that in certain of the chronic cases of the disease there is practically complete absence of the pancreatic ferments and that, whereas the recognized forms of treatment on dietetic and hygienic lines should be rigorously carried out, great improvement and in some cases clinical cure can be brought about by regular and constant administration of pancreatin. It is recommended that pancreatic extract should be administered in doses of 0.3 to 0.6 gramme, with 1.3 to 2.6 grammes of calcium carbonate or lactate three times daily, at an interval of two hours after the larger meals.

(216) Action of Mercurochrome 220 on the Gonococcus.

E. O. Swartz and D. M. Davis (*Journ. Amer. Med. Assoc.*, March 26, 1921) report investigations of the germicidal power of the drug known as mercurochrome 220 on the gonococcus. It was found that this drug possesses a high germicidal power and that its maximum action occurs in a short time. This latter fact distinguishes its action from that of certain other drugs, such as the flavines, in the case of which contact must be maintained over a much longer period to secure the maximal effect. The new drug received clinical trials in cases of cystitis, pyelitis, urethritis and venereal ulcerations. Laboratory tests were further elaborated, to ascertain to what extent germicidal power ran parallel to therapeutic efficiency. It has been found that gonococci are killed in twenty minutes by exposure to a 1 in 16,000 dilution of mercurochrome 220. The drug may be employed for urethral medication in a strength of 1 in 50, which is thus 320 times as strong as that required to kill the organisms experimentally. Solutions of the drug were found to lose their germicidal activity very rapidly on keeping. For clinical purposes it is therefore necessary that fresh solutions should be employed. The authors conclude that this drug is likely to prove a valuable therapeutic agent in the treatment of gonorrhœal infections.

(217) The Treatment of Filariasis with Antimony.

G. C. Low and A. L. Gregg, writing in the *Lancet*, September 11, 1920, published details of a case of infection with *Filaria bancrofti*, in which treatment by means of intravenous injections of *antimonium tartaratum* was given to the patient with unsuccessful results. In extension of their conclusion that tartar emetic was of no proved value in the treatment of filariasis, G. C. Low and Elizabeth J. O'Driscoll (*Lancet*, January 29, 1921) publish details of two further cases in which treatment with large doses of the drug had no influence on the progress of the disease nor on the appearance or number of filarial embryos circulating in the blood. A feature of the first case was the almost complete disappearance of the embryos from the blood for a period of one week before treatment had been commenced. It is thus dangerous in the absence of repeated observations to conclude that the disappearance of embryos is necessarily due to any individual drug. After the number of embryos had become more or less constant it was found that injections of antimony had no discernible influence on the number circulating in the blood. The authors concluded that the adult worms producing the embryos were unaffected by the drug. In the second case large doses of tartar emetic were given to the patient with similar absence of manifest results. Emetine had no influence on the filarial embryos.

(218) Acriflavine Irrigation for Gonorrhœa.

Irrigation with acriflavine as the local treatment of gonorrhœa has a strong advocate in Lewis T. Mann (*Medical Record*, January 22, 1921). He writes that this dyestuff is powerfully gonococcicidal, being 600 times more strong in this respect than protargol. A dilution of 1 in 300,000 will inhibit the growth of gonococci in cultures. As the drug has the power of penetrating the urethral wall as far as the muscular layers, it is especially useful as a slayer of organisms which have hidden in the peri-urethral tissues. One great advantage is its bland, non-irritating character and even when dysuria exists and the *meatus urethræ* is swollen, irrigation may be performed without pain or discomfort to the patient. A solution of 1 in 4,000 in warm physiological saline solution is the strength of choice. For practical purposes a stock solution of 1 in 500 may be kept, to which 4 grammes of sodium chloride to each 60 c.cm. have been added. In preparing a solution for irrigation, 60 c.cm. of the stock solution are diluted up to 600 c.cm. with warm water. This yields a solution of 1 in 4,000 in warm physiological saline solution. Acute anterior urethritis requires daily irrigation of the anterior urethra, the solution being retained for ten minutes. If the "second urine" becomes cloudy the inflammation has involved the posterior urethra and intravesical lavage should be performed unless the inflammation is unusually acute. Of 21 patients suffering from acute anterior urethritis the cure was complete in an average of 13 days. Four patients with acute antero-posterior urethritis were cured in 28 days and four with chronic antero-posterior urethritis and prostatitis in 41 days.

UROLOGY.

(219) Pathology of So-Called Essential Hæmaturia.

Two cases of "essential" hæmaturia are described in detail by W. C. Quinby (*Journ. of Urology*, June, 1920), with special reference to the pathology of the pelvis of the kidney. Both patients had a little lumbar pain, as well as hæmaturia. Complete urological examination, including pyelography, failed to disclose any cause for the bleeding. Nephrectomy was performed in both cases, on account of the free and persistent hæmaturia. Macroscopically the kidneys were normal on the outside but in one case the mucosa of the pelvis and calyces had red spots which sometimes coalesced to form raised, velvety areas, while the pelvic mucosa had a dark red, hæmorrhagic appearance in the other case. Microscopically the renal parenchyma was normal in each case. Just beneath the mucosa of the pelvis generally and of the apices of the pyramids the venules and capillaries did not present their usual appearance, but seemed to be very distended vascular sinuses with thin, delicate walls. Fresh red blood cell extravasations from these sinuses were plainly discernible. The larger vessels in the kidney showed no such change. In one case there was no evidence of tissue reaction around the distended sinuses, whereas in the other case there was distinct inflammatory reaction around the sinuses and hæmorrhages. The cause of these changes can only be conjectured. Bacteria were not found in the lesions. The damage may be due to soluble toxins which have chosen these areas of the kidney for their elective action. Where cases of "essential hæmaturia" have cleared up after intrapelvic injections of silver nitrate, the lesions were probably of the same nature as those just described.

(220) Urine in Paraplegia.

The management of the urinary tract of paraplegic patients is discussed by V. C. David in the *Journal of the American Medical Association*, February 19, 1921. The war proved that the most serious complication of severe injuries to the spinal cord, causing derangement of the urinary mechanism, is infection of the urinary tract. In experiments on dogs, *Bacilli coli* were introduced into a normal bladder, a bladder containing residual urine and a bladder which had been subjected to cystostomy. No macroscopic or microscopic evidences of cystitis were found following the attempt to infect a normal bladder in this way, but in a bladder containing residual urine acute ulcerative cystitis was evident in 24 to 36 hours and a pure culture of *B. coli* was obtained from the renal pelvis in 8 to 11 days. The urethra was occluded and cystostomy performed in eight dogs. After repeated injections of *B. coli* no cystitis was produced, except just round the wound, and in only two cases was the organism found in the renal pelvis. The author concludes that manual expression, to establish periodic automatic expression of urine, should be the treatment in paraplegia when no urinary infection is present. Should infection occur, cystostomy, with a good opening into the bladder, is indicated.

(221) Chronic Urethritis.

Irvin S. Koll (*Amer. Journ. Surgery*, December, 1920) has collected the factors which predispose to chronic urethritis and produce a urethral discharge. These factors are: (*i.*) lowered resistance subsequent to gonorrhœa, (*ii.*) uncleanliness, (*iii.*) constipation (intestinal stasis and accumulation of fæces in the lower alimentary tract account for the greater part of non-venereal infections of the urinary tract), (*iv.*) inflammation of the prostate, seminal vesicles or bladder, (*v.*) trauma, *e.g.*, falls and blows, "stormy coitus" and the so-called "strain," which is a transient hyperæmia and disappears without treatment, (*vi.*) mechanical irritation, *e.g.*, instrumentation and foreign bodies, (*vii.*) chemical irritation, *e.g.*, chronic alcoholism, phosphaturia, hyperacidity of the urine and concentrated irrigating solution, and, finally (*viii.*) thermal irritation such as is caused by irrigating fluids which are too hot. Chronic urethritis must be differentiated from prostatorrhœa and urethrorrhœa. It seems certain that the gonococcus has a limited life in the genitourinary tract. If the infection has been confined to the anterior urethra, one year must have elapsed from the time of the last evidence of infection before consent is given for marriage. If the infection was in the posterior urethra as well, the period must be two years. A persistent chronic urethritis is, as a rule, established on account of one or more of the pyogenic bacteria affecting the urethra through lowered resistance after gonococcus infection. A primary non-gonococcal urethritis does not often become chronic. In regard to treatment, when there is simple, diffuse hyperæmia, with nothing but epithelial exfoliation, the patient should be treated by means of dilatation and silver nitrate instillations. Where there are localized lesions in the urethral glands or the prostatic utricle, these structures should be injected with 1% to 3% silver nitrate solution. Where the prostate or vesicles are affected, massage, followed by irrigations, should be performed. When conservative measures fail vasotomy should be performed. Vesiculotomy is condemned as being a difficult and serious operation and not productive of good results.

(222) The Wax-Bulb Ureteral Catheter.

E. L. Keyes, jun. (*Journal of Urology*, December, 1920) describes the mode of using the wax-bulb ureteral catheter in the diagnosis and treatment of some diseases of the ureter. For routine work the bulb, which is made of beeswax, should be applied just posterior to the second or third eye of the catheter. If the presence of a stone is suspected an olivary bougie with a wax tip is passed, then withdrawn and catheters with bulbs placed conveniently on them are employed. A No. 5 catheter allows ample drainage, especially if the eye is in the kidney pelvis; the wax bulb behind the eye, made as thick as the cystoscope channel will allow, prevents extra-catheter leakage back into the bladder. To prevent scratching of the wax by the cystoscope channel, the catheter is inserted backwards into the latter before the cystoscope is introduced. The only pressure the wax now meets, when care is used, is that of the ureteric orifice. Before introducing the catheter into the ureter, the magnified image of the wax bulb is carefully examined through the cystoscope. After withdrawal from the ureter, the wax bulb is examined for the presence of scratches as it lies in the bladder medium. The method is simple and free from fallacies. The author pleads for the more frequent use of the wax-bulb catheter, for calculi not detected by means of the X-rays will be diagnosed by this means.

(223) Epididymitis.

H. W. McKay (*Urolog. and Cutan. Review*, June, 1920) writes an article on a troublesome complication of gonorrhœa, namely, epididymitis. He points out that the infection is proliferative and destructive. He maintains that abscess formation is common. The *tunica vaginalis* is usually inflamed and is the seat of an acute inflammatory hydrocele. The experience gained with the armies in France impels him to advocate the early recourse to epididymotomy. The testis is held firmly and rotated on its axis. An incision from 1.5 to 5 cm. in length is made to expose the *tunica vaginalis*. The scrotal contents are delivered, the tunic is opened and the hydrocele evacuated. The epididymis is then examined and opened at a selected point with a cataract knife. Pus is sought with a Hagedorn needle. Drainage is provided and the incision is closed in the usual manner. He claims that this treatment shortens the course and yields excellent results.

(224) Ureteroceles.

M. Lavadera (*Surg., Gynec. and Obstet.*, February, 1921) reviews the literature on ureteroceles and reports four cases of his own. Cystic dilatation of the lower end of the ureter, projecting into the bladder, may in some cases result from the stenosis following tuberculosis, stone or inflammation of the ureter. But the great majority are undoubtedly due to the ballooning of the ureter behind a congenitally stenosed meatus. Many of the cases in which there are associated inflammatory reactions or in which calculi are present can be explained on the basis that these complications are secondary to the original stenosis. Symptoms from uretero-cystic dilatations may not arise till adult life, especially if the stenosis is relatively slight at first and increases as the years advance. The writer has discovered 63 cases of ureterocele in the literature. In 32 of these other urinary malformations were present. This fact strengthens the congenital theory,

British Medical Association News.

SCIENTIFIC.

A meeting of the New South Wales Branch was held at the B.M.A. Building, 30-34 Elizabeth Street, Sydney, on April 29, 1921, Dr. Fourness Barrington, the President, in the chair.

Dr. R. J. Silverton read a paper on "Spinal Analgesia in Urinary Surgery" (see page 475).

Dr. H. R. G. Poate read a paper on "Local Anæsthesia" (see page 479).

A third paper was read by Dr. M. C. Lidwill on "Some Modern Methods of General Anæsthesia" (see page 482).

Dr. L. W. Bickle stated that his first experience with spinal anæsthesia dated back to the year 1900. Unfortunately this form of analgesia had to be supplemented with general anæsthesia owing to non-acquaintance with the details of technique. The solution used was one of cocaine in a saturated solution of chloretone. There was no post-anæsthetic vomiting. This happy result was ascribed to the chloretone. For a period of three months every patient undergoing general anæsthesia was given 1 gm. of chloretone an hour and a half prior to operation. The results were most satisfactory and were published in *The Therapeutic Gazette*, October, 1902.

Dr. Bickle had discarded morphine and atropine in favour of chloretone. This drug not only had the advantage of preventing post-operative vomiting, but it also led to an absence of surgical shock. His patients never vomited and came to quickly after operation. He quoted the case of a young girl of nineteen years on whom he had operated for a rapidly growing fibroid tumour of the uterus associated with much hæmorrhage. She was given one gramme of chloretone prior to operation and on the same evening she was quite comfortable and was able to talk rationally. An apparent failure of the drug occurred in one instance. The patient was a woman who for five days following operation suffered severely from vomiting. He discovered that only 0.3 gm. of chloretone had been given. Shortly afterwards a second operation (an abdominal section) became necessary and on that occasion he personally administered 1 gm. of the drug in the form of a cachet before operation. No post-anæsthetic sickness resulted.

Dr. Bickle did not agree with Dr. Poate's statement that morphine had no analgesic action. He once had occasion to operate under local anæsthesia on a patient suffering from strangulated inguinal hernia and there was great difficulty in reducing the sac. He then injected a solution of morphine over the sac and found that he was able to effect reduction without causing the patient pain.

Dr. W. J. Stewart McKay spoke enthusiastically of the mechanical method of anæsthesia. He had tried it seven years previously when it was first introduced to Australia by Dr. Piero Fiaschi. During the last five years he had had the benefit of Dr. Lidwill's skill in the use of the intra-tracheal instrument. He felt sure that it would not be long before it became the only form of anæsthesia used. It had many advantages. It was an artificial respiratory apparatus as well as a means of administering an anæsthetic. Even if the pleura were opened, breathing still went on. He recalled the fact that he had seen some of the dogs on which Dr. Fiaschi had operated at the Australasian Medical Congress, 1914, running about five years later. It was a great tribute to the method that it was now possible to remove the œsophagus with the help of this form of anæsthesia.

Another advantage was the accuracy of dosage. The anæsthetic could be measured exactly and was not given in haphazard fashion. The method was particularly useful for operations upon the mouth. As the catheter lay between the cords blood could not pass beyond the glottis, the return column of air preventing the blood from trickling down. There was one disadvantage, namely, that the return air made the blood bubble over the field of operation. He had noticed this while operating for the cure of cleft palate. The difficulty was surmounted by the use of a sucker. In operations upon the thyreoid gland for the cure of exophthalmic goitre intra-tracheal anæsthesia was invaluable. The anæsthetist sat in a chair away from the field of operation. If the goitre was pressing upon the trachea there was no fear of respiratory embarrassment once the catheter was inserted between the vocal cords. He had occasion lately to operate on a patient suffering from fibroid disease of the uterus associated with very considerable hæmorrhage. She was very weak and the blood count revealed a hæmoglobin value of only 15%. She was almost pulseless. Ether was, however, administered by the mechanical method and although her radial pulse could not be felt, she withstood the operation well and made a good recovery. A notable feature of the method was that in operations on the epigastric region there was an absence of the respiratory movements which were unfortunately associated with ordinary anæsthesia. In operations upon the kidneys the tube could be inserted between the cords, the patient turned over and the anæsthetic administered without any difficulty. Moreover, there was no risk of ether being spilt into the patient's eye. On completion of the operation, the anæsthetist was able to "wash out" the air passages by turning off the current of ether vapour and pumping in a current of air. There was a glad absence of after-effects. There was no bronchitis and practically no vomiting. He would make a suggestion: in cases of morphine poisoning in general hospitals the apparatus might be used. Morphine in large doses caused respiratory failure. If the catheter were placed between the patient's cords death could be prevented, as the patient would be forced to breathe. The same expedient might be used in cases of apparent death from drowning.

Dr. S. A. Smith congratulated Dr. Lidwill and said he could confirm the essential points of Dr. Lidwill's paper in regard to mechanical anæsthesia. Cotton and Boothby, of Boston, had shown by laboratory experiments that when ether was administered by the ordinary methods it was impossible to discover how much was taken up in the air. They invented the "shunt method" and devised an apparatus which would establish accuracy in dosage. But they soon discovered that the measurement of gases was a difficult process. Forsaking the shunt method, they worked in the direction of measuring by weight definite amounts of ether and spilling them into known volumes of air. At first this method of measuring ether dosage necessitated a bulky apparatus, but a portable machine had since been invented whereby the quantities could be estimated accurately in terms of millimetres of mercury. There was very little variation in the quantity of ether needed to preserve surgical anæsthesia. The only variation was in the induction. It was possible by using an apparatus which measured the dose to plot out beforehand how much ether would be given to the patient. In the case of an ordinary adult one would begin, for example, with a pressure of 95 mm. of mercury and by 5 mm. steps cut it down to about 50 mm. in the course of 30 minutes. The patient could then be maintained under good surgical anæsthesia for several hours. The ordinary adult consumed, as a rule, the same amount of ether no matter what the operation, so that it was not a legitimate objection to say that in operations on the upper abdomen a great concentration of ether was necessary. Alcoholic patients needed more ether in the induction stage only and the same was true for adolescents, but once the induction was complete, no more than the usual amount was necessary.

Dr. Smith showed an apparatus used by himself by which a measured dose of ether is added to a stream of air. For anæsthesia by the pharyngeal and the intra-tracheal routes the air given should be twice the amount of tidal air. It was necessary, therefore, to measure the stream of air into which the ether was spilt. His machine could do this. A parachute-apparatus indicated how many litres were being consumed. As a rule, 20 litres of air a minute were needed for the pharyngeal method. As the air passed through, the ether was added to it at a definite rate; for example, 100 drops of ether a minute. His machine was a modification of Connell's machine. The air passed through ordinary surgical gauze which increased the surface for evaporation. The ether vaporized quite efficiently and the strongest adult could be anæsthetized.

In computing the value of different forms of anæsthesia,

the patient was the final gauge, but he was not always a sensitive gauge in the deep stages of anæsthesia. There might be differences of opinion as to whether it was an actual advantage to know the strength of the ether vapour administered. He thought it a great comfort.

Dr. R. Arthur asked Dr. Poate for information on the duration of local anæsthesia. Recently he had consulted a dentist and some teeth had been removed under local anæsthesia. He thought the drug used was eucaine. Next day he felt wretched and could not eat. He felt quite ill. Shortly afterwards he had to consult the same dentist again for a similar purpose. This time apothesine was used and it was quite satisfactory. He noticed that the numbing effect of the anæsthetic spread to the base of his nose and persisted for a week. He suggested that apothesine might be used in cases of inoperable cancer and might be found more satisfactory than an injection of morphine. He had noticed that Dr. Lidwill had made no mention of chloroform. Graduates of Scottish universities would remember that in the old days nothing but chloroform was used. It was often administered in the most irresponsible manner. Chloroform was frequently poured on a towel, the towel was placed on the patient's mouth and the anæsthetist watched the operation with interest. Yet the patient did not die. The hospital anæsthetist was the butt of the surgeon's irascibility, as he could recall himself. His remuneration was beggarly and it was he who had to appear before the coroner. The new mechanical procedure would help to make the *rôle* of the anæsthetist a better one.

Dr. H. S. Stacy said he could confirm the statements of the previous speakers on the value of mechanical anæsthesia. It was excellent in head operations and gave great satisfaction, since there was very little congestion of the veins. In operations upon the mouth it was no longer necessary to do tracheotomy and mechanical anæsthesia prevented the complication of broncho-pneumonia. When ordinary general anæsthesia was used for operations for perforation of typhoid ulcers, broncho-pneumonia was a frequent sequel. It was safer to use local anæsthesia, but he suggested that mechanical anæsthesia might be best. It was often difficult and sometimes impossible to produce local anæsthesia in fat people. In France spinal anæsthesia had been commonly used, but it was associated with such a great fall in blood pressure that it had to be abandoned. In shock the best anæsthetic was probably gas and oxygen.

The Honourable J. B. Nash, M.L.C., stated that the intrathecal use of stovaine preceded by a hypodermic injection of morphine was an ideal form of anæsthesia. He had been told by nurses that after spinal anæsthesia there was no vomiting and the patient was able to swallow a meal. Frequently he had headache, but treatment with aceto-salicylic acid was effective. On the subject of the intra-tracheal method of anæsthesia Dr. Nash paid a tribute to Dr. Piero Fiaschi who was the pioneer of this form of anæsthesia in Australia. The method had eliminated the "death space" (the pharyngo-laryngo-muscular area). It would be more extensively used especially in those cases in which it was necessary to operate on the thorax and at the same time maintain freedom of respiration.

Dr. A. J. Aspinall asked how much adrenalin could be administered with safety. As a house surgeon in 1905 he had been requested by an otologist to inject 1.25 c.cm. of a 1-1,000 solution of adrenalin over one mastoid area of a patient on whom a mastoid operation was to be performed. Soon afterwards the patient collapsed, vomited and seemed about to die. He recovered, however. He had since been extremely careful to give only small doses of adrenalin.

Intra-tracheal anæsthesia was of great value in operations upon the head and jaw, but he considered there was too common a tendency for the anæsthetist to think that the method was safe and to watch the operation. Every anæsthetic of whatever kind was attended with danger and the patient's every breath should be closely watched. Open ether was an excellent anæsthetic and properly given it was safe. Chloroform also had its advantages and he was of opinion that every student should be carefully instructed in its use.

Dr. A. G. Brydon extolled the Shipway apparatus. It gave comparatively level anæsthesia and the method allowed the anæsthetist to avoid obstructing the surgeon. In cases of shock gas and oxygen were excellent. In France as soon as the blood pressure of a patient suffering from shock rose to 70 mm. of mercury an operation had been permitted. The removal of the patient to the operating theatre caused a fall in pressure to about 50 mm.. The patients were well anæsthetized with gas and oxygen and the results were excellent. In some instances local anæsthesia was used in association with this form of general anæsthesia.

Dr. Fourness Barrington thanked the members who had contributed papers and had entered into the discussion. He considered that three facts had been made out that evening. The first was that local anæsthesia had a wide sphere; the second was that anæsthesia was both a science and an art, and the third that there was a great value in mechanical anæsthesia. Dr. Lidwill had spoken of pre-anæsthetic medication. In private practice it was commonly used, but in the gynæcological wards at the Royal Prince Alfred Hospital none of his patients received it unless they were of the bovine type—fair, fat and forty. But on recovering from the anæsthetic when vomiting set in, they were given a hypodermic injection of .075 gm. of morphine. He considered scopolamine a dangerous drug. Three of his patients who had been given scopolamine and morphine had remained unconscious for 24 hours. Occasionally he had prescribed 0.0006 gm. of scopolamine, 0.015 gm. of morphine and 0.0004 gm. of atropine in the tabloids of Burroughs Wellcome & Company, when it was imperative to give his patient a good refreshing sleep, but it was necessary to insure that the scopolamine was good. Since the appointment of a tutor in anæsthetics at the Royal Prince Alfred Hospital the resident physicians had given anæsthetics extremely well. In regard to chloroform he considered it very necessary in obstetrical practice. It was wise to administer very little, to give it during the pains and to withdraw it during the intervals.

In his reply Dr. R. J. Silverton stated that in regard to Dr. Stacy's suggestion that spinal anæsthesia might be useful in operations for perforated typhoid ulcer, he thought that spinal anæsthesia was inadvisable whenever the patient was in a very low state of health. Even though only a moderate height of analgesia was necessary for sub-umbilical incisions there was always some fall in blood pressure. Dr. Nash had stated that if spinal anæsthesia could be used for operations on any part of the body, it would be the ideal anæsthetic for general use. Such a method had been introduced in 1908 by Jonnesco, of Bucharest. This surgeon had used four points of injection according to the set of nerve roots he desired to anæsthetize. These points were respectively medio-cervical, cervico-dorsal, dorso-lumbar and lumbar. He combined neutral sulphate of strychnine with stovaine to stimulate the respiratory and cardiac nerve centres. Since the war Jonnesco had published an enormous list of results. He had in five years used spinal analgesia 10,000 times without a death. In a tenth of these cases the analgesia was high. In the medio-cervical injection the dosage of stovaine used was between 5 milligrams and 2 centigrams according to the age and state of the patient. With this injection the phrenic nerves were paralysed, but the intercostal muscles carried on respiration. A similar dose was used for the cervico-dorsal injections and in these cases many of the intercostal muscles were paralysed, but the phrenic nerves were not affected. Dr. Silverton considered that the risk of respiratory paralysis was too great, even when Jonnesco's careful technique was used.

Dr. H. R. G. Poate stated in his reply that the objection to stovaine put forth by Dr. Silverton that headaches were common sequels, might be explained by the fact that alkalies decomposed the drug. A fresh solution should be used and ampoules of stovaine should be avoided. He could endorse Dr. McKay's remarks on the subject of mechanical anæsthesia. It gave the surgeon freedom of manipulation and it was admirable in operations on the head, neck and upper abdomen. He had noticed that for a few days following anæsthesia by the intra-tracheal route the patients complained of slight pain and a sense of constriction in the lower part of the chest. But the method had the great virtue of absence of vomiting. In regard to Dr. Bickle's

opinion that morphine had a local anæsthetic action, Dr. Poate was of the opinion that in the instance cited the effect was not local but general, as the result of absorption. In reply to Dr. Arthur's question as to the relative advantages of eucaine and apothesine, he considered the latter preferable. Finally, he was glad to see Dr. Brydon with them that evening. Dr. Brydon had been his anæsthetist in a casualty clearing station in France and had performed his duties in a thoroughly efficient manner.

Dr. M. C. Lidwill replied that he could not subscribe, like Dr. Bickle, to the virtues of chloretone. He had used it, but had abandoned it on account of its appalling taste. He disagreed with Dr. Smith's statement that it was desirable to measure the amount of air used during anæsthesia. It was sufficient to ensure that the patient got enough air, but the actual measurement was of no importance. As regards post-anæsthestic pneumonia only one instance of this complication was experienced in about 6,000 cases of anæsthesia at the Royal Prince Alfred Hospital.

He had had a fair amount of experience with gas and oxygen, but the great objection to this mode of anæsthesia was that the patient became conscious too suddenly and suffered from too much post-operative pain. It was also difficult to keep the patient sufficiently under the influence of the anæsthetic. Another cogent objection was that the method was very expensive. At the Royal Prince Alfred Hospital students were taught to use ether by the open and closed methods and they were also instructed in the use of chloroform. If well given, closed ether was the best of these anæsthetics. Open ether was always associated with a fall of blood pressure, whereas the carbon-dioxide concentrations of closed ether helped to maintain the blood pressure at a reasonably high level. Chloroform was a dangerous anæsthetic during the induction period. Once the patient was well under its influence it was reasonably safe, provided the blood pressure remained high.

COUNCIL TRANSACTIONS.

The Council of the Victorian Branch desires to record its more important transactions, so that Victorian members may be conversant with the policy of the Branch. It is proposed to publish information of this nature once a month.

The Library.

The Council for the past twelve months has been endeavouring to rid the shelves of the library of all text-books whose only merit is that of antiquity. On the other hand, books and journals have been received from members at intervals of six months or more after they have ceased to use them regularly for reference. It has been suggested that groups of members might buy journals not now in the library and hand them on to the library at the end of twelve months. By this method a large supply of comparatively new literature might be forthcoming. The Council has also decided to devote 25% of the profits of the Medical Agency for this year to the library. Members by supporting the Medical Agency would thus help themselves and their library. Members are informed that they are permitted to remove bound volumes from the library at any time. Unbound volumes must be perused in the reading room.

Salaries.

Quarantine Officers.

Members of the Council appeared before the Arbitration Commissioner and advocated a starting salary of £600 and periodical increases to £900.

Naval Medical Officers.

Dr. Fetherston assisted the Naval Board. It will recommend that medical officers' salaries shall start at £600, rising to £1,000 after twelve years' service. Mess allowance and insurance policies are to be deducted.

Municipal Health Officers.

The Health Commission recommended to municipalities that a salary of £100 to each 10,000 of population and increase of £5 for each 1,000, and £50 for each 5,000 and £10 for each 1,000 of population over 5,000 for boroughs and shires, should be paid to their medical officers. To municipalities 190 circular letters were sent and 206 to medical officers, inquiring whether effect had been given to the recommendations. A large number of replies is now to hand and these are being tabulated for submission to a later Council meeting.

Rules of the Association.

The rules which have been amended from time to time, have now been consolidated. Copies are being printed and will be circulated amongst members.

Roll of Honour.

The Council has adopted a scheme, submitted by a sub-committee, whereby Mr. Web Gilbert will execute a tablet in bronze surmounted by two figures representing an army medical officer attending to a fallen comrade on the field of battle. The names of those who died in the cause of Empire will be inscribed on the tablet. The whole, fixed in position, will cost not less than £600. It is proposed to raise this amount by contributions of one guinea from members of the Branch. The plastic model submitted was highly admired and the executed work in time should be of priceless value, as Mr. Web Gilbert holds a high position in the ranks of the world's sculptors.

Autonomy of Overseas Branches.

Dr. R. H. Todd, the Federal Delegate to the Conference to be held in London in June, attended a special meeting of the Council and set forth very succinctly the purposes of his mission and the difficulties to be overcome.

Increased Subscription.

We have instructed our representatives on the Central Council, London, and on the Representative Body to ask for a supplementary grant of 12s. 6d. for this year, so as to bring the contribution to London for this year to what it is now proposed to be for future years. At the solicitation of the Federal Committee the Central Council will recommend to the Representative Body that the contribution from overseas bodies shall be £1 10s. 6d. *per caput*, with a rebate of 7s.. In the past the contribution was 25s., less 4s.. This year the contribution is £2 2s., less 5s..

Preventive Medicine.

As already reported in the *Journal*, a section of preventive medicine has been formed, with a committee and executive officers.

Election of Members.

Twenty-one recent graduates were elected members of the Branch. Arrangements have been made with the Medical Students' Society to secure the filling in of application forms by graduates as soon as they have registered with the Medical Board. The initial experiment has proved successful.

Federal Tariff.

This matter is under the consideration of a sub-committee which has been empowered to take action with regard to the duties on imported instruments and drugs and with regard to medicinal alcohol.

"The Speculum."

Strong exception was taken by members of the Council to items appearing in the May issue of the medical students' magazine, which were characterized as obscene and not fit to be read by decent people. Such a magazine was calculated not only to injure the medical students, but to bring the profession into disrepute. A letter couched in strong terms has been sent to the Committee of the Medical Students' Society which is responsible for the magazine.

Dispute with the Friendly Societies.

On June 1, 1921, practically only one order will not be working in harmony with the British Medical Association. This is the Manchester Unity Independent Order of Oddfellows which refused the overture of the Council to accept the terms of the settlement of the dispute by the first day of June. The Council has circularized metropolitan mem-

bers of the Branch, informing them that the members of that Order must be charged uniformly 10s. 6d. a consultation or visit. Considerations of expense prevented the Council from making this observation more widely known by circular, so this opportunity has been taken of also instructing the country members.

Notices.

The Scientific Committee of the Victorian Branch announces the following papers to be read at meetings of the Branch in July and August, 1921:

July 6, 1921.—Mr. Victor Hurley, C.M.G., Mr. Alan Newton and Mr. W. D. G. Upjohn, O.B.E.: "Blood Transfusion; Indications for Transfusion; Testing of Donors; Preparations of Patient and Donor; Technique of Operation; After Care."

August 3, 1921.—Mr. A. Fay Maclure, O.B.E.: Paper and Demonstration at the Alfred Hospital: "On the Making and Fitting of Modern Splints and Fracture Beds, Together with a Display of Splints."

William Keith Muston, Esq., M.B., Ch.M., 1920 (Univ. Sydney), has been nominated for election as a member of the New South Wales Branch.

The undermentioned have been elected as members of the Victorian Branch:

Lawrence Victor Eiszele, Esq., M.B., B.S., (Univ. Melb.), 1920, Parkville.

Harry Lawrence Stokes, Esq., M.B., B.S. (Univ. Melb.), 1921, Alfred Hospital.

Ernest Harold Britten, Esq., M.B., Ch.B. (Univ. Melb.), 1917, Cheltenham.

Correspondence.

ETHER ANÆSTHESIA.

Sir: In the recent discussion at the Victorian Branch of the British Medical Association reported in the *Journal* of May 21, the advisability of a preliminary administration of alkaloids to ether anæsthesia caused some difference of opinion amongst the anæsthetists.

This question is an important one and your readers should be encouraged to offer their opinions thereon.

In my student days at the Melbourne Hospital it was all chloroform and artificial respiration, varied by inversion of the patient and bumping his head on the floor.

At this period at the Women's Hospital, however, these gymnastic performances were not given, as ether was the routine anæsthetic and one gained an early appreciation of ether anæsthesia conducted so skilfully by Dr. Paul Farmer.

My first experience with preliminary medication was with atropine in small doses with a Clover's inhaler and the results were highly satisfactory in checking excessive mucous secretion.

Later on, following Hewitt's instructions in his admirable work, morphine in varying amounts was added with good results; but for the last ten years morphine and hyoscine have displaced morphine and atropine, as hyoscine has all the advantages of atropine with some additional benefits of its own.

The dose is never larger than one-sixth of a grain of morphine sulphate and one hundred-and-fiftieth of a grain of hyoscine hydrobromide given one hour before the administration is commenced, and it is important that the patient be kept quiet and encouraged to drowse after the injection.

Morphine and hyoscine abolish the patient's apprehensions, cause a pleasant somnolence and favour a quiet and even induction and maintenance of anæsthesia by open ether without salivation or secretion of mucus in the air-passages. Ocular signs are not unduly interfered with unless the morphine and hyoscine be given in an unbalanced dose. The quantity of ether absorbed into the patient's circulation is lessened, post anæsthetic vomiting is rare and tendency to operation shock is diminished by the preliminary administration of morphine and hyoscine in correct doses.

In winter anæsthesia is advantageously maintained by warmed ether vapour from Shipway's portable apparatus, which I have modified to give a warmer vapour and moistened if necessary.

In my experiences open ether or warm ether vapour without preliminary injection of morphine and hyoscine after about three-quarters of an hour's administration tends to cause salivation and excessive mucous secretion in the air passages.

In such a case it is best to discontinue the pure ether and use either Dudley-Buxton's alcohol-chloroform mixture or Hewitt's C.E. mixture.

Many anæsthetists condemn mixtures but in their proper sphere and given properly on an open gauze-covered mask, they are admirable additions to one's armamentarium. On a semi-open mask, like Shield's mask, they are very dangerous.

These are briefly my views on this important subject, though the question covers such an amount of ground that it is difficult to express one's views in a few sentences and I hope that others interested in anæsthetics will have something to say on the matter.

Yours, etc.,

A. G. McGOWAN.

Ballarat,
May 29, 1921.

Proceedings of the Australian Medical Boards.

VICTORIA.

The undermentioned have been registered under the provisions of Part I. of the *Medical Act, 1915*, as duly qualified medical practitioners:

Brown, John Noel, M.B., B.S., Melb., 1919, Ringwood.

Ellis, Carlton Atkinson, L.R.C.P., Lond., M.R.C.S., Eng., 1907, F.R.C.P., Edin., 1909, Flinders Naval Depôt, Western Port.

Hecker, Stewart Roy, M.B., B.S., Adelaide, 1919, Murrayville.

Hodges, Feo. Agincourt, L.R.C.P. *et* S., Edin., L.R.F.P.S., Glas., 1913, c/o. Union Bank, Collins Street, Melbourne.

Anderson, Esme Vivienne, M.B., B.S., Melb., 1921, "Charlton," Harcourt Street, Auburn.

Cameron, Winifred Barbara, M.B., B.S., Melb., 1921, 87 Powlett Street, East Melbourne.

Darby, Louis Victor, M.B., B.S., Melb., 1921, 155 Church Street, Hawthorn.

Dunkley, John Francis, M.B., B.S., Melb., 1921, St. Arnaud.

Eddy, Violet Gertrude, M.B., B.S., Melb., 1921, 30 Beaconsfield Parade, St. Kilda.

Fulton, Robert Leo., M.B., B.S., Melb., 1921, 78 Kinkora Road, Hawthorn.

Furnell, Herbert Giblin, M.B., B.S., Melb., 1921, St. Vincent's Hospital, Melbourne.

Greer, Clive Mansley, M.B., B.S., Melb., 1921, 183 Rathmines Road, Upper Hawthorn.

Hallam, Keith Holly, M.B., B.S., Melb., 1921, Alfred Hospital, Prahran.

Harbison, Harold William, M.B., B.S., Melb., 1921, Numurkah.

Hembrow, Charles Hugh, M.B., B.S., Melb., 1921, Pooronga Road, East Caulfield.

Hudson, Sydney Bernard, M.B., B.S., Melb., 1921, Corowa, New South Wales.

Kelly, John Horace, M.B., B.S., Melb., 1921, Melbourne Hospital.

Longden, Norman Anderson, M.B., B.S., Melb., 1921, Buninyong.

Lyle, Mary Ranken, M.B., B.S., Melb., 1921, "Lisbuoy," Irving Road, Toorak.

Mackay, Geo. Eric, M.B., B.S., Melb., 1921, Melbourne Hospital.
Middleton, Leslie James, M.B., B.S., Melb., 1921, Melbourne Hospital.
McIntosh, Ronald Dingwall, M.B., B.S., Melb., 1921, 3 Cross Street, Canterbury.
O'Sullivan, Timothy John, M.B., B.S., Melb., 1921, St. Vincent's Hospital, Melbourne.
Robertson, Effie Jessie, M.B., B.S., Melb., 1921, 35 Hutcheson Street, Moonee Ponds.
Searby, Clifford Henry Coomer, M.B., B.S., Melb., 1921, Gillies Street, Hampton.
Shaw, John Holmes, M.B., B.S., Melb., 1921, Melbourne Hospital.
Sheinkin, Benjamin, M.B., B.S., Melb., 1921, 1 Queen Street, East Brunswick.
Shelton, James Newman, M.B., B.S., Melb., 1921, "Wimmera," Sutherland Road, Armadale.
Southby, Robert, M.B., B.S., Melb., 1921, 97 Royal Parade, Parkville.
Sprinfthorpe, Annis Guy Hale, M.B., B.S., Melb., 1921, Omama Road, Murrumbeena.
Stanton, Byron Lionel, M.B., B.S., Melb., 1921, Melbourne Hospital.
Stokes, Harry Lawrence, M.B., B.S., Melb., 1921, "Lissadurn," Toorak Road, South Yarra.
Tonkin, Cyril Joseph, M.B., B.S., Melb., 1921, Kamarooka Street, Sunshine.
Townsend, Ruby Adele, M.B., B.S., Melb., 1921, 88 Wellington Street, Kew.
Trumpy, Oswald Robert, M.B., B.S., Melb., 1921, Warragul.
Wanliss, Marion Boyd, M.B., B.S., Melb., 1921, "Rayleigh," Point Lonsdale.
Warner, Beatrice Alice, M.B., B.S., Melb., 1921, Melbourne Hospital.
Wood, Barbara Grendon, M.B., B.S., Melb., 1921, "The Grange," Alfred Street, East Kew.
Williams, Frederick James, M.B., B.S., Melb., 1921, "Sheldwill," Ballater Street, Essendon.

The undermentioned additional qualification has been registered:

Guymer, Ernest Albert, F.R.C.S., Edin., 1920.

The names of the late Dr. Charles Smith and the late Dr. Henry Michael O'Hara have been removed from the Register.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser," page xxv.

University of Adelaide: Professor of Zoology.

Medical Appointments.

IMPORTANT NOTICE.

Medical practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, 429 Strand, London, W.C..

Branch.	APPOINTMENTS.
NEW SOUTH WALES. (Hon. Sec., 30-34 Elizabeth Street, Sydney.)	Australian Natives' Association. Ashfield and District Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham Dispensary. Manchester Unity Oddfellows' Medical Institute, Elizabeth Street, Sydney. Marrickville United Friendly Societies' Dispensary. North Sydney United Friendly Societies. People's Prudential Benefit Society. Phœnix Mutual Provident Society.
VICTORIA. (Hon Sec., Medical Society Hall, East Melbourne.)	All Institutes or Medical Dispensaries. Manchester Unity Independent Order of Oddfellows. Australian Prudential Association Proprietary, Limited. Mutual National Provident Club. National Provident Association.
QUEENSLAND. (Hon. Sec., B.M.A. Building, Adelaide Street, Brisbane.)	Australian Natives' Association. Brisbane United Friendly Society Institute. Stannary Hills Hospital.
SOUTH AUSTRALIA. (Hon. Sec., 3 North Terrace, Adelaide.)	Contract Practice Appointments at Renmark. Contract Practice Appointments in South Australia.
WESTERN AUSTRALIA. (Hon. Sec., 6 Bank of New South Wales Chambers, St. George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND: WELLINGTON DIVISION. (Hon. Sec., Wellington.)	Friendly Society Lodges, Wellington, New Zealand.

Diary for the Month.

June 14.—N.S.W. Branch, B.M.A., Ethics Committee.
June 14.—Tas. Branch, B.M.A..
June 15.—W. Aust. Branch, B.M.A..
June 16.—Vic. Branch, B.M.A., Council.
June 21.—N.S.W. Branch, B.M.A.: Executive and Finance Committee.
June 23.—Clinical Meeting at the Hospital for Sick Children, Brisbane.
June 24.—Q. Branch, B.M.A., Council.
June 24.—N.S.W. Branch, B.M.A..
June 28.—N.S.W. Branch, B.M.A.: Medical Politics Committee: Organization and Science Committee.
June 29.—Vic. Branch, B.M.A., Council.
June 30.—S. Aust. Branch, B.M.A., Annual.
July 1.—Q. Branch, B.M.A..
July 5.—N.S.W. Branch, B.M.A., Council (Quarterly).
July 6.—Vic. Branch, B.M.A..
July 8.—N.S.W. Branch, B.M.A., Clinical.
July 8.—Q. Branch, B.M.A., Council.
July 8.—S. Aust. Branch, B.M.A., Council.
July 12.—N.S.W. Branch, B.M.A., Ethics Committee.
July 12.—Tas. Branch, B.M.A..
July 13.—Melb. Pædiatric Society (Vic.).
July 14.—Vic. Branch, B.M.A., Council.

EDITORIAL NOTICES.

Manuscripts forwarded to the office of this journal cannot under any circumstances be returned.

Original articles forwarded for publication are understood to be offered to *The Medical Journal of Australia* alone, unless the contrary be stated.

All communications should be addressed to "The Editor," *The Medical Journal of Australia*, B.M.A. Building, 30-34 Elizabeth Street, Sydney. (Telephone: B. 4685.)